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Pharmacological Study on *Ipomoea carnea* - A Review

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ABSTRACT

The genus Ipomea contains a wide variety of species that can be found growing along road side in wastelands and along canals. *Ipomoea carnea* is a plant that grows up to 600 centimetres tall and is straight, woody, bushy and slightly cylindrical in shape with a greenish tint. It is also known as Besharm or bush morning glory, the stem of the *Ipomoea carnea* plant has different leaves. This plant is utilised as a folk medicine in Ayurveda, Siddha and Unani system of medicine and literature suggest that *Ipomoea carnea* may have anti-oxidant, immunostimulant, anticancer, hepatoprotective and various other pharmacological activity. T2-ethyl-1,3-dimethylbenzene, 2-(12-pentadecynyloxy) tetrahydro2H-pyran, 3-furanyl[2-hydroxy-4-methyl-2-methyl-2-methylpropyl-cyclopentyl] methanone, 2,2-dideuterooctadecanal, hexadecanoic acid, Linoleic acid are chemical components of Ipomoea carnea. After conducting a thorough examination of the literature. Ipomea Carnea has been shown to be a safe, cost-effective, and potentially therapeutic herb for the treatment of a variety of ailments. Integrating its active components or extracts or fractions in suitable drug delivery system can be used to investigate its therapeutic potential.

Key words- *Ipomoea carnea*, Chemical Analysis, Pharmacological studies, Pharmacological studies

BACKGROUND

Ipomoea carnea is an Indian native that has spread to numerous places throughout the world, including Java and Indonesia (1). Ipomoea carnea (Besharm, Bahay) is a large, diffuse or struggling shrub with milky juice, ovate cordate, entire, acuminate, pedunculate cymes, fruits glabrous capsule, seed, silky belonging to the Convolvulaceae family, and ovate cordate, entire, acuminate, pedunculate cymes, fruits glabrous capsule, seed, silky (2). It's common in planes and lowland areas near water sources. Morning glory is a species of *Ipomoea carnea* Jacq. In the Nile Delta, farmers use this plant as an ornamental and hedge plant along the sides of irrigation and drainage canals and it propagates vegetatively via stems that may root in a matter of days. This plant reproduces vegetatively by sending out stems that root in a matter of days. *Ipomoea carnea* contains phenolic acid, alkaloids, flavonoids, coumarins, and sterols, among other bioactive components (8). This plant may be used as a green manure since it adds necessary nutrients to the soil through leaf incorporation which helps to increase grain output. It is used to improve soil fertility in farmland. It is common in tropical nations such as Chhattisgarh, India (6). *Ipomoea carnea* is a rare weed. It was introduced as a green manure crop in India barely a few decades ago. This non-woody plant comes in a variety of colours. Allow cost yearly renewable supply of high-quality fibres that

can be effectively cultivated without requiring much maintenance in temperate and tropical weather conditions (7). This plant may be found in the American tropics, Argentina, Brazil and Bal via, Pakistan, and Sri Lanka, it is widely spread in India with concentration in Chhattisgarh and Madya Pradesh (3). The stem of *Ipomoea carnea* used in the production of papers. The herb has various medicinal properties. It has a component that is identical to marselin, is an anticonvulsant and sedative (4). Morning glory as the name suggests a flower that blooms in the morning. Morning glory, a glistering flower that blooms with the sun, dries up in the afternoon and fades in the night (5).

Main Text-

Uses-

- Paper may be made from the stem of the Ipomoea carnea.
- The stem can also be utilised as a source of firewood.
- It has a sedative and anticonvulsant component that is similar to marselin.
- The leaves are used as fertilizer.
- From Ipomoea carnea, a glycosidic saponin with anticarcinogenic and oxytoxic effects has also been isolated.

Figure- ***Ipomoea carnea***

Geographical Description-

Ipomoea carnea blooming, evergreen shrub reaches a height of 5 metres. The stem is sturdy and grows into a strong trunk with many branches from the base over several years. The stem is upright, woody, hairy, and cylindrical in form, with a greenish colour. It has leaves that alternate. It usually reaches to 1.24 to 2.74m in length and 0.5-0.7 cm in diameter. The leaves are light green and either heart-shaped or lanceolate in form and 10 to 25cm in length. The upper side of the leaf has a drab green colour, while the bottom surface is a lighter colour. The leaves are on their way out. Leaves that receive less sunlight may grow bigger than those that receive full sun (9). Flowers in loose, dichotomously branching axillary and terminal, pedunculate cymes are pale rose, pink or light violet fruits have a glabrous capsule, seed is silky (10).

Classification (11)-

Kingdom- Plantae
Sub kingdom- Tracheobionta
Division- Spermatophyta
Subdivision- Magnoliophyta
Class: Magnoliopsida – Dicotyledons
Subclass- Asteridae
Order- Solanales
Family- Convolvulaceae
Species- *Ipomoea carnea L*

Synonyms-
Marathi- Besharm
English- Bush Morning glory
Oriya- Bahay
Bengali- Besharm
Hindi- Besharm, Bahay
Others- Pink Morning Glory, Borrachero, Bush Morning Glory, Badoh Negro, Matacabra, Morning Glory Tree

Chemical analysis-

Ipomoea carnea have cold water solubility, hot water solubility, ether solubility, alcohol benzene solubility, 1% NaOH solubility, pentosan content, lignin content, holocellulose, hemicellulose, alpha cellulose, acetyl content, methoxyl content, uronic anhydride, Ash Content (12).

Table 1- Chemical Analysis

S. No	Parameters	Results
1.	Alcohol benzene solubility	8.46
2.	Lignin content	18.08
3.	Ash Content	6.14
4.	Cold water solubility	8.43
5.	Methoxyl content	4.76
6.	Pentosan Content	17.60
7.	Alpha cellulose	46.45
8.	Holocellulose	67.49
9.	Hemicellulose	22.40
10.	Hot water solubility	12.60
11.	Acetyl content	4.32
12.	1% NaOH solubility	28.6
13.	Uronic anhydride	3.45
14.	Ether Solubility	3.04

Note- The values are expressed in % on OD woody material basis.

Propagation of *Ipomoea carnea*

The plant is usually propagated by stems (vegetative technique) and can root in a week. Creeping along the ground, roots in the earth, and a new plant sprouts up independently from the primary plant. Plants travel in river to downstream habitats, which are developed on bank, during strong rains, floods, or other natural disasters. Seed is another means of propagation. This is a widely used approach. Fruit is opened by the trees throughout the winter. The hairy seeds and fracture in the dry fruit wall are scattered by the wind and water. the stiff seed coat prevents seeds from germinating promptly. The outer coat of the seed is removed after it germinates due to temperature and water treatment. Plant stems are harvested for firewood because of their spreading propensity. In Orissa, there has been a concerted effort to grow the plant for use as a green manure for some years (13).

Ipomoea carnea as aquatic weed problem

It is referred to as a weed because of its uncontrolled population and quick spread on land and water. Plants block and complicate the proper utilisation of land for agricultural purposes. It has an impact on irrigation, navigation, and fishing in the water. Because of its quick growth rate, wide distribution, and capacity to adapt to both aquatic and xerophyte ecosystems. This plant has the potential to be another ecological disaster in India (13).

Chemical Analysis-

Root- It contains2-Ethyl-1,3-dimethylbenzene, 2-(12-pentadecynyloxy) tetrahydro2H-pyran, 3- furanyl [2-hydroxy-4-methyl-2-(2-methylpropyl) cyclopentyl]-methanone, 2,2- Dideuterooctadecanal Hexadecanoic acid and Linoleic acid (14).
Stem- It contains 2-(12-Pentadecynyloxy) tetrahydro-2H-pyran, 1-Octadecanol, Hexadecanoic acid, Epiglobulol, Squalene, 1-Octadecanol (14).
Leaves- It contains a number of pharmacological constituents like hexadecanoic acid, stearic acid, 2 diethyl phthalate, n-octadecanol, octacosane, hexatriacontane, tetracontane, 3-diethylamino-1- propanol. Leaves also contains swainsonine and calystegines B1, B2, B3 and C1(15).
Flowers- It contains flavonoids, tannins, glycosides, alkaloids, carbohydrates and phenolic compound (16).
Seeds- It contains swainsonine and calystegines B1, B2, B3 and C1(15).

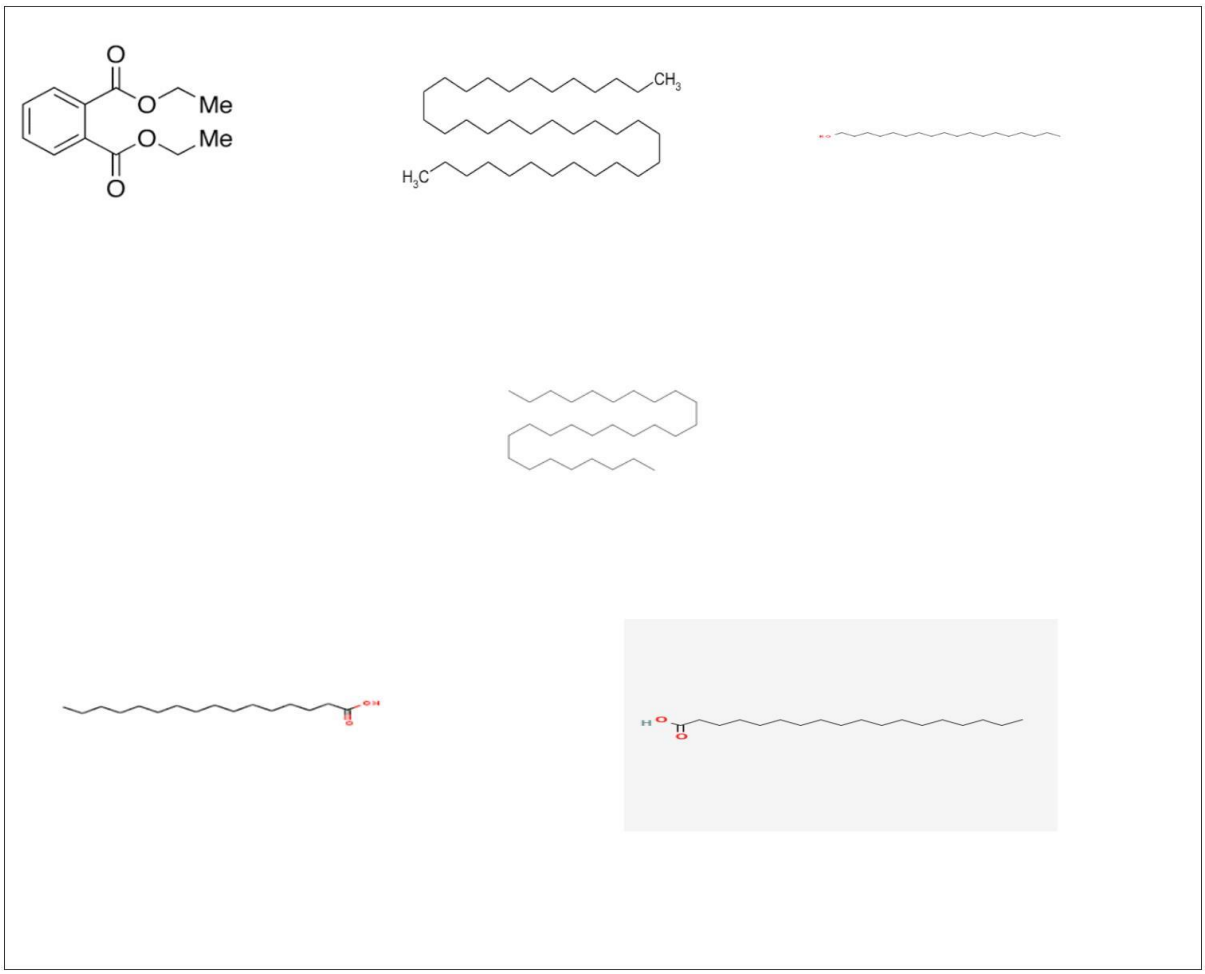

Figure 2- Chemical structures of compounds present in *Ipomoea carnea*

Pharmacological studies-

Immuno-modulatory effect-

In female rats, the nor tropane alkaloids calystegines B1, B2, B3, and C1 and the indolizidine alkaloid swainsonine of *Ipomoea carnea* demonstrate an influence on spleen/body weight ratio, thymus/body weight ratio, and histological alterations (17).

Anti-oxidant activity-

Antioxidants are a class of chemicals that can stop other molecules from oxidising by quenching reactive free radicals, and so may have health benefits in the prevention of degenerative illnesses. antioxidants such as polyphenols and flavonoids are abundant in the leaves, stems, and flowers of *Ipomoea carnea*. Polyphenol and flavonoids found in *Ipomoea carnea* have been shown to have high DPPH radical scavenging action. Scavenging is critical for preventing the harmful effects of free radicals in disorders like cancer. The floral section of this plant, in particular, is higher in anti-oxidant phytoconstituents. Phenols and flavonoids are abundant in the leaves, stems, and flowers of *Ipomoea carnea* (18).

Wound healing activity-

Fresh *Ipomoea carnea* flowers were extracted with 95% ethanol, the extract was concentrated in vacuum, and the aqueous concentrate was treated with successive fractions of different solvents, including diethyl ether, chloroform, and ethyl acetate. Kaempferol and its 3-O—D glucoside can be found in the fresh flowers of *Ipomoea carnea*. These were known to have a lot of

wound-healing potential. Wound healing usually begins with an inflammatory phase, followed by fibroblast proliferation, collagen fibre creation, and scar shrinkage and drying. These stages occur at the same time but are unrelated to one another. These actions are equivalent to Sulphathiazole and far superior to wounds that have not been treated (19).

Anti-Inflammatory Activity-

Anti-inflammatory efficacy was tested using aqueous extracts of mature green leaves of *Ipomoea carnea*. The extracts were given at doses of 250 mg per kilogramme and 500 mg per kilogramme of body weight. The study found that *Ipomoea carnea* leaves had a substantial anti-inflammatory effect at a level of 500 mg/kg, and that it outperforms Etoricoxib 6 mg/kg (20).

Antifungal Activity-

Ipomoea carnea has been found to have antifungal effect against Alternaria alternative and Curvularia lunata. *Ipomoea carnea* extracts in chloroform and methanol have antifungal efficacy against eleven pathogenic and non-pathogenic fungi. Colletotrichum gloeosporioides and Cladosporium coumarone were used as test organisms to obtain antifungal fractions of *Ipomoea carnea* leaves. The purified fraction's efficacy was further validated by the dose-dependent suppression of Alternaria alternative and A. porri spore germination. A combination of (E)-octadecyl p-coumarate and (Z)-octadecyl p-coumarate was found as the active fraction (21).

Cardiovascular Activity-

When an aqueous extract of *Ipomoea carnea* was injected into an isolated frog heart, the heart was temporarily blocked for 5 to 10 seconds. The time increased up to 2 minutes when the dosage was increased. It's possible that sodium extrusion or intracellular calcium release causes *Ipomoea carnea* to have a favourable inotropic impact on isolated frog hearts (26). When 1 g/ml atropine was added to the extract, the early different phase was inhibited, and the stimulant action became grate (22).

Nervous System activity-

Ipomoea carnea is a toxic plant that has a negative impact on the central nervous system. Hirsute coat, depression, difficulty standing up, ataxia, hypermetria, wide–based stance, incoordination of muscular movements, intense tremors, spastic paresis, abnormal postural reactions, nystagmus, hyperreflexia, hypersensitivity to sound, head tilting, and loss of equilibrium were all observed in goats fed fresh leaves flowers and stems of *Ipomoea carnea* for 45 to 60 days. One of the primary organs damaged by *Ipomoea carnea* poisoning is the cerebellum. This organ coordinates skeletal muscle movements by processing input from other neurological regions, primarily the spinal cord and sensory receptors (23).

Anti-hypoglycaemics activity-

Alloxan (150 mg/kg) dissolved in distilled water was administered intraperitoneally into rats. Blood samples were taken from the retro-orbital venous plexus after 48 hours under mild ether anaesthesia, and the serum was centrifuged to determine the glucose level. Only rats with blood glucose levels more than 250 mg/dl were chosen as hyperglycaemic animals. The hyperglycaemic rats were then divided into six groups, each with ten rats: first, a healthy control group, second, diabetic rats serving as a positive control, third, diabetic rats receiving 100 mg/kg b.wt. of leaves ethanol extract, fourth, diabetic rats receiving 100 mg/kg b.wt. of flowers ethanol extract, fifth, diabetic rats receiving 20 mg/kg b.wt. of rutin, and sixth, diabetic rats receiving 100 orally for 10 consecutive days. Hyperglycaemia was verified 48 hours after the alloxan injection, when the extracts and Metformin were begun. A blood sample was taken from the retro-orbital venous plexus of 18 h food-deprived rats 24 hours after the last dosage of either pharmacological treatment and centrifuged at 3000 rpm for 10 minutes. The serum was acquired using a test reagent kit (Bio diagnostic, Egypt) to determine the blood glucose level as quinine amine. At 510 nm, the absorbance was measured and the

findings were reported in mg/dl (24).

Antimicrobial activity-

Only a few studies have looked at the antibacterial properties of *Ipomoea carnea* components. Even if the plants have been examined by other researchers, the literature review finds that no similar study on leaf extracts has been done. Crude extracts of *I. carnea* leaves, such as n-hexane, ethyl acetate, acetone, ethanol, and acetone fraction (fraction A) of acetone extract, have been shown to exhibit antibacterial activity. The crude acetone extract kills Proteus vulgaris and Salmonella typhimurium, while the crude ethanol extract kills Pseudomonas aeruginosa. This is the first research to indicate that the acetone extract inhibits Proteus vulgaris and Salmonella typhimurium, whereas the ethanol extract inhibits Pseudomonas aeruginosa of *I. Carnea* leaves (24).

Hepatoprotective activity-

In rats, liver injury was caused by injecting 5 ml/kg of 25 percent carbon tetrachloride (CCL4) in liquid paraffin intraperitonially. The animals were divided into four groups of ten rats each, with the first group receiving a daily oral dose of 1 ml saline for one week before and after liver damage, and the second and third groups receiving daily oral doses of (100 mg/kg body weight) leaves and flowers ethanol extracts of *Ipomoea carnea*, respectively, for one week before and after liver damage and the administration of extracts was continued for another month after liver injury; fourth group: liver injured rats were pre-treated with a daily oral dosage of (25 mg/kg body weight) silymarin as a reference standard medication, and the drug was administered for another month after liver damage. After that, entire blood was taken from the retro orbital venous plexus through the eye canthus of anaesthetized rats after an overnight fast. Blood samples were taken at the start, one month, and 72 hours following the carbon tetrachloride injection, as well as at one-month intervals. Centrifugation was used to separate the serum. Alanine aminotransferase (ALT, GPT), aspartate aminotransferase (AST, GOT), and alkaline phosphatase (ALP) are all enzymes found in the blood. The Student T test22 was used to analyse the data (24).

Anti-diabetic activity-

The anti-diabetic properties of *Ipomoea carnea* leaves were tested in normal and streptozotocin-induced diabetic rats in one research. The aqueous extract of *Ipomoea carnea* lowers blood glucose levels in rats considerably. In normal rats, it improves glucose tolerance (25).

Anti-cancer activity-

The hydroalcoholic extract of *Ipomoea carnea* leaves has substantial anticancer properties with a dose-dependent impact, according to in-vitro and in-vivo investigations. This is most likely owing to phytochemicals such as alkaloids, phenols, and flavonoids being present (26).

Anxiolytic activity-

The central depressive action of *Ipomoea carnea* appears to be sedative hypnotic. The anxiolytic effects of the aqueous and methanolic extracts of *Ipomoea carnea* leaves (32.50 and 16.25 mg/kg intraperitonial.) in mice were examined utilising elevated plus maze, open field test, and hole board test paradigms, using diazepam as a positive control. In mice, the lethal dose 50 of *Ipomoea carnea* leaf aqueous extract (ICLAE) and *Ipomoea carnea* methanolic extract (ICLME) was 325 mg/kg i.p. body weight. When compared to ICLAE (32.5mg/kg and 16.2mg/kg) and diazepam, ICLME had a stronger anxiolytic effect. When compared to control and diazepam 1mg/kg, 2mg/kg as a benchmark, the effect of the ICLAE and ICLME demonstrated a dosage dependant significant increase in the number of head dipping behaviours in full board tests at doses 32.5 and 16.2 mg/kg. These findings suggest that ICLAE and ICLME have anxiolytic properties (27). In experiments using mature goats, all of the animals displayed anomalous behaviour and consciousness, as well as atypical goat behaviour (ability to stand and posture), and one goat died (28).

CONCLUSION

The herb is exceedingly useful and safe for medical purposes, according to traditional medicinal literature. A strong and safe medicine can be researched from the plant for many chronic conditions employing reverse pharmacological techniques in natural drug development. Although much study has been done on the plant genus *Ipomoea carnea* to date, a huge number of activities have not been carried out on all portions of the plant. As a result, a vast field of future study in which the isolation of noble active biomolecules from this species would be of considerable scientific use in phytochemistry and phytopharmacology remains potential. Furthermore, because certain plant extracts have only been researched in vitro, an advanced clinical evaluation of them is need.

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