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EXPLORING THE MULTIFACETED MEDICINAL PROPERTIES OF CRINUM LATIFOLIUM

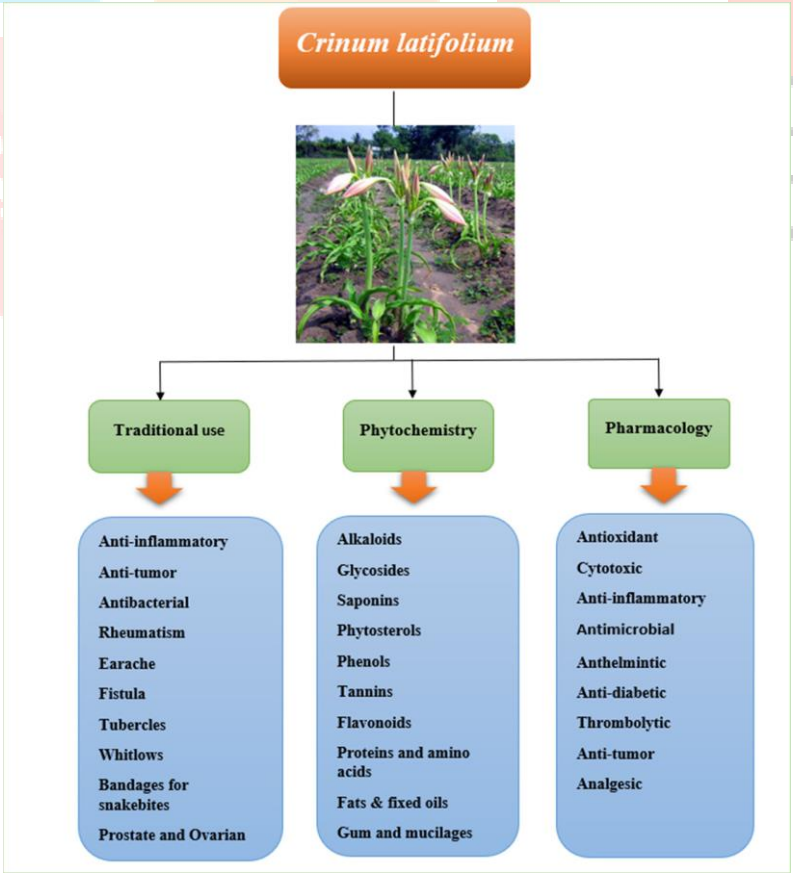
Omer Alam[1],Mr. Qumre Alam[2], Mrs. Anjali Singh[3], Sidra Kausher[4]

[1&4]M.Pharm scholar, Innovative College of Pharmacy, Greater Noida,

[3&4]Associate Professor, Innovative College of Pharmacy, Greater Noida

Abstract: Crinum latifolium Linn., a member of the Amaryllidaceae family, is widely distributed throughout the world's tropics, subtropics, and warm temperate regions. The plant's varied components contain bioactive substances that are used to treat a variety of ailments, including rheumatism, fistula, tumors, earaches, rubefacient, tubercle, and whitlow. The page describes the plant's numerous chemical ingredients, which include alkaloids, flavonoids, terpenoids, and phenolic chemicals. The review also dives into the multiple pharmacological actions linked with Crinum latifolium, including anticancer, anti-inflammatory, antioxidant, and anti-diabetic properties.

Keywords: Crinum latifolium, Sudarshan, Pharmacological activities, Phytochemistry, Pharmacognosy



INTRODUCTION

There are numerous therapeutic herbs available globally. Weeds are potent medicinal plants that can address various health concerns. India has long been renowned as a rich source of natural treatments in ancient societies. Crinum is a genus that has over 180 species, including a wide family of attractive perennial plants. These flowers, also known as Spider lily, Trumpet flower, and Swamp lily, are commonly used in gardens, bouquets, and decorations. Crinum is a tropical plant that grows in Asia, Southeast Asia, Australia, the Pacific Islands, the Caribbean, Florida, and Louisiana. Crinum latifolium is referred to as "Sudarshana" or Sukhdarshan in Ayurveda. Simply looking at it can provide peace and contentment. Crinum defixum was mentioned by Sushruta in Ayurvedic literature from 5000 BC (Kandali). This plant is mostly used in Ayurveda to treat painful swellings, unexplained fevers, poisoning, and skin diseases.

Traditional medicine utilizes medications derived from plants, animals, and minerals, as well as spiritual, manual, and physical therapies. These strategies can be used individually or together to diagnose, prevent, treat, and maintain health. (Gunjan et al., 2015).The compositions contain organic material, minerals, and therapeutic plants.(Pal et al., 2003).Approximately 80% of people in underdeveloped countries still use traditional medicine, which relies on plant and animal species for primary treatment. Manuscripts from several languages, including Indian, Chinese, Egyptian, Greek, Roman, and Syrian, date back to roughly 5000 years. Classical Indian literature includes Rigveda, Atharvaveda, Charak Samhita, and Sushruta Samhita. Indigenous medicine systems use around 800 plants, with approximately 500 documented in ancient texts for therapeutic purposes. India boasts strong medicinal plant traditions and a vast collection of therapeutic plants used in traditional medicine.Approximately 25,000 plant-based medicines are used in folk medicine and are widely known in rural India.(Verma et al., 2008; Kamboj et al., 2000). India is often referred to as the "Medicinal Garden of the World". The belief in the safety of natural products is the sole factor driving their popularity and appeal. Plant-based products are becoming increasingly popular in both developed and developing countries. This includes pharmaceuticals, cosmetics, and food supplements. Natural products are becoming increasingly popular due to their non-toxicity, little side effects, and affordability. (Sharma et al., 2008).

The World Health Organization (WHO) believes that herbal therapies are used two to three times more than conventional medications worldwide. Plants have been used for therapeutic purposes since prehistoric times and are the foundation of much modern medicine. The majority of the few effective medicines from a century ago were plant-based, therefore many conventional pharmaceuticals today are derived from plants. Examples include morphine (opium poppy), quinine (cinchona bark), dioxin (foxglove), and aspirin (willow bark). Several therapeutic compounds that were previously derived from plants are now commercially manufactured. Tetrahydrocannabinol, salicylic acid, papaverine, Ldopa, emetine, ephedrine, pseudoephedrine, caffeine, and theophylline are some of them.(Gunjan et al., 2015) Crinum is a prominent genus in the Amaryllidaceae family, with a global distribution over tropics, subtropics, and warm temperate zones. Crinum is a genus containing around 180 perennial plant species. These flowers, also known as Spider lily, Trumpet flower, and Swamp lily, are commonly used in bouquets, gardens, and decorations (Refaat et al., 2013; Parihar et al., 2021).

The Amaryllidaceae family includes both wild and cultivated plants found globally. Amaryllidaceae plants are primarily composed of alkaloids and flavonoids. Crinum, a genus of the Amaryllidaceae family, comprises plants used for traditional medicine (Köktürk et al., 2022). Crinum latifolium L. (Amaryllidaceae), also known as "Sudarshan," has been used in Asian folk and traditional medicine to treat various medical conditions such as benign prostate enlargement, prostatitis adenoma, hypoxia, uterine fibroids, detoxification, inflammation, hormone balancing, tissue regeneration, and improved cell-mediated immunity. It also acts as an effective T-lymphocyte activator. Leaf juice is used to treat rheumatic pain, sprains, and earache.Chemical components such as Amaryllidaceae alkaloids, pyrrolophenan-thridine alkaloids, lycorine, 2-epilyocorine, and 2-epipancrassidine, as well as carbohydrates, proteins, amino acids, and glycosides, play important roles in medicinal properties(Solanki et al., 2011; Ahmad et al., 2018).

GEOGRAPHICAL DISTRIBUTION

Crinum latifolium is a tropical plant found in South Asia, Southeast Asia, the Caribbean, Malaysia, Singapore, Australia, America, the Philippines, Fiji, Florida, Thailand, Louisiana, and other tropical regions. Tropical Asia includes Indo-China, Myanmar, Sri Lanka, Bangladesh, Vietnam, Andaman Island, Thailand, and Nicobar Island. It is extensively dispersed in India, particularly in Brajendranagar, Udaipur, Tripura, Assam, and Kerala (Parihar et al., 2021; Chahal et al., 2021; Sarma et al., 2016).

SYNONYMS

Crinum latifolium (Family: Amaryllidaceae) having synonym Trumpet Lily, Spider Lilly [Eng.], Chinder, Kanwar, Kunwal, Pindar Baranwar [Hindi], Nagdaun [Urdu], GadambiKanda [Marathi], Bada Kanod, Sukha Darshana, GaerhonarPatta [Bengali], Sudarshana, VishaMungli [Kannada], VishaPungil, Vishamungil, Perumanarivingaatam [Tamil], KesaraChettu [Tamil] (Parihar et al., 2021).

HABITAT

Native to Myanmar. It grows naturally in Asia, including India, Sri Lanka, mainland Southeast Asia, and southern China (Guangxi, Guizhou, Yunnan). It has also been naturalized in the West Indies and the Chagos Archipelago.

CHEMICAL CONSTITUENTS

The Crinum latifolium leaf extract contains carbohydrates, alkaloids, glycosides, saponins, phytosterols, phenols, tannins, flavonoids, proteins, amino acids, fats, and fixed oils. Alkaloids can be found in the aqueous extract or juice of Crinum latifolium leaves, in addition to gum and mucilage. Examples include crinamine, crinamidine, crinafoline, and crina folidine. The medicinal plant's pharmacological activity stems from its alkaloids and other chemical ingredients.

HISTORY PERSPECTIVE

Crinum latifolium, a member of the Amaryllidaceae family, is referred to in Ayurveda as "Sudarshana" and "Sukhdarshan". It means that just gazing at it makes you feel happy and at ease. In Asian folk and traditional medicine, it has been used as a rubefacient and tonic, as well as to cure allergic ailments and tumor diseases.It has also been used to treat critical medical conditions such as benign prostate enlargement, prostatitis adenoma, hypoxia, uterine fibroids, detoxification, inflammation, hormone balancing, tissue regeneration, and to improve cell-mediated immunity. It is also an effective T-lymphocyte activator. It was originally used to treat rheumatism, tumors, fistulas, earaches, tuberculosis, rubefacient, and whitlow.Crinum latifolium compositions are still utilized today in traditional Chinese and Vietnamese medicine because of their antiviral and anticancer properties (Ahmad et al., 2018; Aziz et al., 2014).

TAXONOMY

The Amaryllidaceae family spans 1310 species and 90 genera worldwide. Crinum is a genus of plants in the Amaryllidaceae family with over 180 species used in folk medicine. Crinum latifolium is a perennially flowering herbaceous plant from the amaryllis family (Parihar et al., 2021; Jenny et al., 2011). Table 1 describes its taxonomical classification (Yadav et al., 2020).

Table 1: Taxonomical Classification.

Kingdom	Plantae
Phylum	Angiosperms
Class	Monocots
Order	Asparagales
Family	Amaryllidaceae
Genus	Crinum
Species	latifolium

MACROSCOPIC CHARACTERISTICS

Crinum latifolium is a vigorous herbaceous perennial plant with large tunicate bulbs, rosette-like clusters, and aged leaf sheaths. It originated from an underground bulb. The leaves are smooth, fleshy, simple, linear-lanceolate, coriaceous, and have an entire edge. They measure 45-100 cm long and 3-6 cm wide (Fig. 1). The huge, wide leaves resemble a snake's hood. There are beautiful white blossoms with a crimson tint. Flowering stems are stout and lengthy, measuring 2 to 3 mm. Fruits are spherical, 2-3 inches in diameter, with 8-10 seeds. Short pedicel. The 4-5 cm long funnel-shaped perianth tube has white lobes with purple tinges and a short, acuminate apex.

Anthers are linear, measuring 1.2-1.8 cm long, with six stamens and filaments shorter than the perianth. Three inferior carpels with a few ovules each. Ovoid capsule, 1–1.5 cm in length. The flowering season runs from May to June. C. latifolium is a member of the lily family and shares many characteristics with the common garden lily. Unlike most lilies, C. latifolium does not require insect pollination to reproduce (Parihar et al., 2021; Chahal et al., 2021). Table 2 shows the morphology of the main clusters and subclusters (Yakandawala et al., 2006).

Table 2: Morphology of Crinum latifolium.

Crinum latifolium	**Characteristic features**	
Leaf	Form	Flaccid
	Margin	Slightly scabrous and undulate
	Blade	Slightly keeled
	Woolly appearance when torn	Less

Peduncle	Colour	Prominent purplish
	Shape	Oval
Bract	Colour	Purple coloured
	Texture	Papery, translucent
	Persistence	Early withered
Perianth	Tube colour	Green with purple tinge
	Segment Shape	More or less symmetric, lanceolate
	Curvature	More reflex
Stigma		Dark purplish
Filaments		White with purple colour distally
Anthers		Yellowish with purple median streak
Fruit development		Lack fruit development

Fig. 1. Crinum latifolium plant and its parts.

TOXICITY STUDIES

Herbal medicines have long been used to treat a range of ailments. To ensure the safety of the plant extract, preventative toxicity studies are necessary due to the lack of experimentally proven dose consistency (Falya et al., 2020). The term "toxicity" often refers to the interaction between chemicals and natural systems. Crinum plants are hazardous due to their alkaloid content. Consuming fresh roots and uncooked bulbs results in nausea, vomiting, and diarrhea (Refaat et al., 2013). The crude methanolic extract of Crinum latifolium leaves showed a positive toxicity result (LD50 15.652 µg/ml) when compared to the standard vincristine sulphate (0.839 g/ml) in toxicity testing. This suggests that the leaves have modest effects. Plant extracts include high levels of bioactive components and cytotoxic chemicals. Anthocyanins, saponins, tannins, flavones, and polyphenols are active substances that have been shown to act as free radical scavengers, hydrogen donors, antioxidants, reactive species quenchers, detoxification inducers, enzyme activators, normal cell differentiation promoters, tumor production and proliferation cell inhibitors, and apoptosis inducers. The methanolic extract of Crinum latifolium leaves may be poisonous due to bioactive chemicals, although the exact mechanism of action remains unknown (Parihar et al., 2021; Aziz et al., 2014).

PHYTOCHEMISTRY :

Leaves Extract of Crinum Latifolium	Aqueous Extract or Juice of Leaves of Crinum Latifolium	Other Chemical Constituents
· Carbohydrates, · Alkaloids, · Glycosides, · Saponins, · Phytosterols, · Phenols, · Tannins, · Flavonoids, · Proteins And · Amino Acids, · Fats & · Fixed Oils Gum and Mucilage's	· Crinamine, · Crinamidine, · Crinafoline, · Crina Folidine	· N - Benzyl - N - (B - Phenethylamine) Nucleus (Belladinetype) · 2 - Benzopyrano - (3, 4 G) - Indole Nucleus (Lycoreninetype) · PyrrolophenanthridineNucleus (Lycorine - Type) · Dibenzofuran Nucleus (Galanthamine - Type) · 5, 10 B - EthanophenanthridineNucleus (Crinine - Type) · 2 - Benzopyrano - (3, 4 C) - Indole Nucleus (Tazettinetype) · 5, 11 - Methanomorphanthridine Nucleus (Montaninetype) · BenzylisoquinolineNucleus (Cherylline - Type)0

PHARMACOLOGICAL ACTIVITY

Antimicrobial activity

The methanolic extract of the Crinum latifolium plant shown antibacterial efficacy against both gram-negative and gram-positive bacteria using the disc diffusion method.

Anti – inflammatory activity

The methanolic extract of Crinum latifolium plant demonstrated anti-inflammatory activity of 16.21% and 20.55% at 10mg/ml in hypotonic solution and heat-induced conditions.

Thrombolytic nature

The plant was discovered to have substantial thrombolytic properties ($p < 0.001$). The plant demonstrated medium clot lysis (14.64±0.540%, 18.01±0.766%, 21.78±1.039%, 28.43±0.982%, and 33.84±1.749%) at doses of 2, 4, 6, 8, and 10mg/ml. The crude methanolic extract of Crinum latifolium shows thrombolytic action.

Antitumor activity

Extracts of crinum latifolium and alkaloid fraction (expect pure 6 - hydroxycrinamidine) stop the proliferation of lymphoma cells

Anthelmintic activity

Anthelmintic activity was assessed applying five different concentrations of the plant extract and recording the time of paralysis and death.

Induced Degranulation of mast cells

The study examined how glucan A and phosphatidyllycorine from Crinum latifolium L. (family Amaryllidaceae) affect the rate of mast cell degranulation in albino rats. In vitro, different combinations of glucan A and phosphatidyllycorine (5-20 and 5-10 µg/mL, respectively) provided considerable protection against Tween 80-induced degranulation and sensitized mast cells challenged with horse serum. In vivo, the combination (10-20 mg/kg) effectively prevented mast cell degranulation caused by compound 48/80.

Antibacterial and anticancer activity

Silver nanoparticles (AgNPs) and gold nanoparticles (AuNPs) were synthesized using an aqueous extract of C. latifolium leaves. The CL-AgNPs effectively suppressed the activity of four bacterial strains. The biosynthesized metallic nanoparticles (MNPs) demonstrated good catalytic degradation.

Inhibit human umbilical endothelial cells formation

Bioassay-guided separation was used to identify 4 - senecioyloxymethyl - 3, 4 - dimethoxycoumarin, 5, 6, 3' - trihydroxy - 7, 8, and 4' - trimethoxyflavon from Crinum latifolium methanol extract. Compound 4 - senecioyloxymethyl - 3, 4 - dimethoxycoumarin inhibited the development of human umbilical venous endothelial cells (HUVECs) in vitro, but had no harmful effects on tumor cell lines (B16F10, HCT116). At doses as low as 1 microg/mL, the inhibitory efficacy remained significant (53.5%). Compounds 5, 6, 3'-trihydroxy-7, 8, 4'-trimethoxyflavone had a minor inhibitory effect on HUVEC tube formation.

Anticancer activity

Crinum latifolium bulbs were extracted with 95% EtOH, yielding four bioactive Amaryllidaceae alkaloids: 4, 8-dimethoxy-cripowellin C (1), 4, 8-dimethoxy-cripowellin D (2), 9-methoxy-cripowellin B (3), and 4-methoxy-8-hydroxy-cripowellin B (4). Cripowellin C (5) was also discovered. The alkaloids 1-5 showed strong cytotoxicity against all seven tumor cell lines examined ($IC50 < 30$ nM).

Antimicrobial activity

Alkaloids 9-methoxy-cripowellin B and 4-methoxy-8-hydroxy-cripowellin B showed considerable antibacterial action, with IC50 values <0.50 mM.

Antioxidant activity

The alkaloids 9-methoxy-cripowellin B and 4-methoxy-8-hydroxy-cripowellin B shown antioxidant activity in the ABTS·+ and DPPH tests. Alkaloids 1-5 showed comparable inhibition of Cox-1 (>64%) and Cox-2 (>90%) compared to a positive control.

Estrogenic activity

Crinum Latifolium has been researched for its estrogenic action, which means it can mimic or modify the effects of estrogen in the body. According to research, Crinum Latifolium includes phytoestrogens, which interact with estrogen receptors in the same way that natural estrogen does. This trait may have ramifications for hormonal balance and menopausal symptoms. Further inquiry on Crinum Latifolium's estrogenic activity may shed light on its medicinal potential, particularly in women's health.

MEDICINAL USES

Crinum bulbs and leaves are beneficial in herbal remedies. It effectively treats major health disorders including prostatitis, adenoma, benign prostate enlargement, and uterine fibroids. It is used to boost cell-mediated immunity and activate T lymphocytes.
It is also used to treat hypoxia, inflammation, detoxification, tissue regeneration, and hormonal imbalance. Leaf juice is used to treat earaches, rheumatic pain, and sprains. Bulbs produce vomiting.

CONCLUSION

This review suggests that C. latifolium has medicinal properties and is used in folk medicine, as evidenced by multiple investigations. Plant-based medications are becoming increasingly popular due to their lower cost and less hazardous effects. C. latifolium has been shown to have antioxidant, antibacterial, diabetic, cancer, and anti-inflammatory effects. C. latifolium has chemical components that can be used to create herbal remedies and cure various clinical diseases.

FUTURE SCOPE

Medicinal plants can be found all over the world, and their medicinal advantages, while unknown in strength, may be useful in treating a variety of medical ailments. The eastern Himalayas are a treasure trove of medicinal plants due to regional climatic differences and diverse biological environments.Crinum latifolium hoped for new drugs that target complex physiological and cellular reactions, while it remains unclear how these treatments work. Traditional applications include the treatment of cancer, diabetes, and arthritis. The aqueous extract of C.latifolium has shown cytotoxic action in vitro. Further research using different methodologies is needed to determine its effect on normal cells and identify potential distinctions. Further research on this plant could aid in the development of novel herbal medications for human use.

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