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Crinum latifolium: An Updated Review on its Pharmacognosy, Phytochemistry and Pharmacological Profile

Anju Goyal[1], Manish Devgun[1], Lalita Dahiya[1], Sachin Bisyan[2*], Gajender Saini[2] and Dimple Kumar[2]

[1]Assistant Professor, Institute of Pharmaceutical Sciences, Kurukshetra University, Kurukshetra (Haryana), India.
[2]Research Scholar, Institute of Pharmaceutical Sciences, Kurukshetra University, Kurukshetra (Haryana), India.

(Corresponding author: Sachin Bisyan)*
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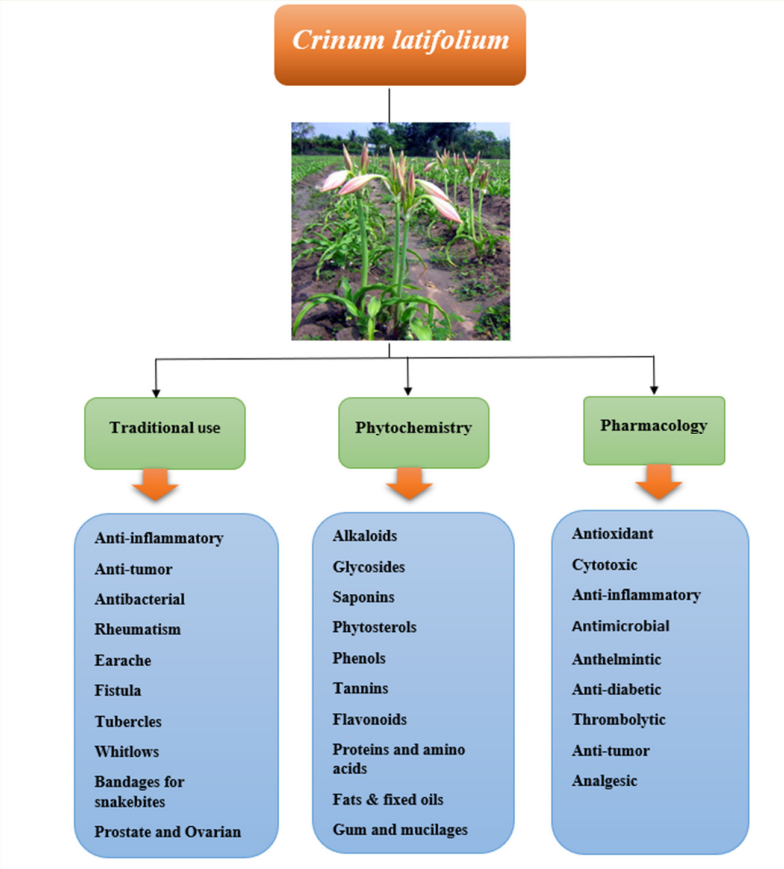
ABSTRACT: Amaryllidaceae family member *Crinum latifolium Linn.* is extensively spread throughout the world in the tropics, subtropics, and warm temperate regions. The various parts of the plants are rich in bioactive compounds, which are used to cure a wide range of illnesses, including rheumatism, fistula, tumors, earaches, rubefacient, tubercle, and whitlow. The article highlights the various chemical constituents found in the plant, including alkaloids, flavonoids, terpenoids, and phenolic compounds. Additionally, the review delves into the numerous pharmacological activities associated with *Crinum latifolium*, such as antitumor, anti-inflammatory, antioxidant, and anti-diabetic activities. A variety of treatises, reference materials, and databases, including Google Scholar, Scopus, PubMed, Science Direct, Web of Science, etc., were used to compile all the information on this plant. The contributions of such a study can help to establish the medicinal uses, active components, and safety profile of the plant, which can lead to the development of new drugs or lead compounds.



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

INTRODUCTION

Traditional medicine includes medical procedures, methods, practices, and theories that use drugs derived from plants, animals, and minerals, as well as spiritual therapies, manual therapies, and exercises. These methods may be used separately or in combination to diagnose, prevent, treat, or maintain health (Gunjan *et al.,* 2015). Its formulations include organic material, minerals, and therapeutic herbs etc. (Pal *et al.,* 2003).

It is currently estimated that for their primary healthcare, around 80% of people in developing nations still rely on traditional medicine, which is mostly based on species of plants and animals. Their use is first documented in manuscripts from around 5000 years ago in Indian, Chinese, Egyptian, Greek, Roman, and Syrian languages. The Rigveda, Atharvaveda, Charak Samhita, and Sushruta Samhita are some examples of classical Indian literature. Around 800 plants have been employed in indigenous medical systems, and approximately 500 plants with therapeutic uses are documented in ancient literature. India has one of the most extensive medicinal plant traditions in the world and an immense vault of therapeutic plants that are utilized in traditional medical treatments. There are estimated to be around 25,000 potent plant-based formulations, employed in folk medicine, and well known in rural communities in India (Verma *et al.,* 2008; Kamboj *et al.,* 2000). As a result, India is frequently referred to as the "Medicinal Garden of the World". The only element influencing their acceptance and attraction is the conviction that all natural products are secure. There is a rising market for plant-based drugs, cosmetics, food supplements, and other goods in both developed and developing countries. This is due to the growing acceptance of the fact that natural goods are non-toxic, have fewer adverse effects, and are widely accessible at reasonable prices (Sharma *et al.,* 2008).

The World Health Organization (WHO) estimates that the usage of herbal treatments is two-to-three times greater than that of conventional drugs worldwide. The use of plants for therapeutic reasons predates recorded human history and is the source of much modern medicine. Most of the few effective treatments from a century ago were plant-based, therefore, many conventional drugs today are derived from plants. Examples include morphine (from the opium poppy), quinine (from cinchona bark), dioxin (from foxglove), and aspirin (willow bark). There are several substances with medicinal value that were formerly acquired from plant sources but are now synthesized commercially. Tetrahydrocannabinol, salicylic acid, papaverine, L-dopa, emetine, ephedrine, pseudoephedrine, caffeine, and theophylline are among them (Gunjan *et al.,* 2015).

With its extensive geographic distribution throughout the world in tropics, subtropics, and warm temperate zones, the genus Crinum constitutes a significant sector in the family Amaryllidaceae. Crinum is a genus of roughly 180 species that makes up a magnificent family of perennial plants. They are used for bouquets, gardens, and decoration, and are also known as Spider lily, Trumpet flower, and Swamp lily (Refaat *et al.,* 2013; Parihar *et al.,* 2021).

Amaryllidaceae species are wild and cultivated plants in different regions around the world. Alkaloids and flavonoids are the main components of Amaryllidaceae plants. The large Amaryllidaceae family's Crinum genus contains plants that are used in traditional healing (Köktürk *et al.,* 2022). *Crinum latifolium* L. (Amaryllidaceae), popularly known as "Sudarshan", has been used to treat serious medical conditions like benign prostate enlargement, prostatitis adenoma, hypoxia, uterine fibroids, detoxification, inflammation, hormone balancing, tissue regeneration, and to improve cell-mediated immunity as well as an efficient T-lymphocyte activator in Asian folk and traditional medicine. Leaf juice is used for rheumatic pain, sprain, and earache. These actions are attributed to the presence of various chemical components, including Amaryllidaceae alkaloids, pyrrolophenan-thridine alkaloids, lycorine, 2-epilyocorine, and 2-epipancrassidine, as well as carbohydrates, proteins, amino acids and glycosides, which play an important role in medicines (Solanki *et al.,* 2011; Ahmad *et al.,* 2018). The geographical, historical, botanical, and pharmacological perspectives of *Crinum latifolium* are highlighted in the current review.

Geographical description. *Crinum latifolium* is a tropical plant widely distributed in South Asia, Southeast Asia - Caribbean countries, Malaysia, Singapore, Australia, America, Philippines, Fiji, Florida, Thailand, Louisiana, and other tropical countries. In Tropical Asia it can be found in Indo-China, Myanmar, SriLanka, Bangladesh, Vietnam, Andaman Island, Thailand, Nicobar Island. In India, it is widely distributed throughout the country, mainly found in Brajendranagar, Udaipur, Tripura, Assam, Kerala (Parihar *et al.,* 2021; Chahal *et al.,* 2021; Sarma *et al.,* 2016).

Botanical Description. *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).

History perspective. Ayurveda uses the terms "Sudarshana" and "Sukhdarshan" to describe the plant *Crinum latifolium*, which belongs to the Amaryllidaceae family. It means that simply looking at it makes you feel pleased and at peace. It has been used as a rubefacient, tonic, and for the treatment of allergy illnesses and tumor diseases in Asian folk and traditional medicine. Additionally, it has been applied to the management of critical medical situations like benign prostate enlargement, prostatitis adenoma, hypoxia, uterine fibroids, detoxification, inflammation, hormone balancing, tissue regeneration, and to improve cell-mediated immunity as well as an efficient T-lymphocyte activator. It was traditionally used to cure rheumatism, tumors, fistula, earaches, tubercle, rubefacient and whitlow. *Crinum latifolium* formulations are still used today in traditional Chinese and Vietnamese medicine

because of their antiviral and anticancer effects (Ahmad *et al.,* 2018; Aziz *et al.,* 2014).

Taxonomy. Amaryllidaceae is a large, widely distributed family with 1310 species and 90 genera worldwide. The genus Crinum of the Amaryllidaceae family contains about 180 species of plants, where they are used in folk medicine. *Crinum latifolium* is a herbaceous, enduringly blooming plant in the amaryllis family (Parihar *et al.,* 2021; Jenny *et al.,* 2011). Table 1 provides information about 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. The herbaceous, perennial *Crinum latifolium* is a robust plant with enormous tunicate bulbs and stoloniferous, rosette-like clusters and are covered with old leaf sheaths. It arises from an underground bulb. Smooth, fleshy, simple, linear-lanceolate, coriaceous, entire margin leaves are around 45–100 cm long and 3-6 cm wide as shown in Fig. 1. The large, wide leaves resemble the hood of a snake. Beautiful white flowers with a reddish tinge are present. Flowering stems are thick, long, and around 2 to 3 mm in length. Fruits are round, 2–3 inches in diameter, and have 8–10 seeds within. Short pedicel. The lobes of the 4-5 cm long, funnel-shaped perianth tube are white with frequent purple tinges, and the apex is short and acuminate. Anthers are linear, 1.2–1.8 cm long, and have six stamens with filaments shorter than the perianth. Inferior carpels three, few ovules. Ovoid capsule, 1–1.5 cm length. The flowering season lasts from May to June. Since *C. latifolium* belongs to the lily family, it resembles the common garden lily in many ways. *C. latifolium* does not require insect pollination in order to reproduce, even though most lilies are mostly insect and bird pollinated (Parihar *et al.,* 2021; Chahal *et al.,* 2021). Its morphology of the main clusters/clades and subclusters is given in Table 2 (Yakandawala *et al.,* 2006).

Fig. 1. *Crinum latifolium* plant and its parts.

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

Toxicity studies. Herbal drugs have traditionally been used to treat a variety of diseases. Because the consistency of doses has not been established experimentally, preventative toxicity studies should be completed to guarantee the safety of the plant extract (Falya *et al.,* 2020). The term "toxicity" often relates to the connection between chemical substances and natural frameworks. *Crinum* plants are known to be toxic due to their alkaloidal content. Fresh roots and raw bulbs ingestion causes nausea, vomiting and diarrhoea (Refaat *et al.,* 2013). When compared to the standard vincristine sulphate (0.839 g/ml), the crude methanolic extract produced a positive result (with LD50 15.652 µg/ml) for toxicity studies, indicating that the leaves of *Crinum latifolium* have mild toxicity effects. We know that plant extracts contain a greater quantity of bioactive

components as well as several compounds with cytotoxic activity. Anthocyanins, saponins, tannins, flavones, and polyphenols, among other active substances, were reported to be free radical scavengers, hydrogen donors, antioxidant, reactive species quenchers, detoxification inducers, enzyme activators, normal cell differentiation promoters, tumor production and proliferation cell inhibitors, and apoptosis inducers. So, the bioactive substances may be accountable for the potential toxicity of the methanolic extract of *Crinum latifolium* leaves, while the precise mechanism of action is still unknown (Parihar *et al.,* 2021; Aziz *et al.,* 2014).

Traditional use. The anti-inflammatory, anti-tumor, and antibacterial qualities of *C. latifolium* are employed in traditional Asian medicine (Aziz *et al.,* 2014; Jenny *et al.,* 2011; Nguyen *et al.,* 2013). Crinum bulbs and leaves are utilised in herbal medications. Traditional medicine has treated several diseases with extracts made from various parts of this plant. In traditional Chinese and Vietnamese medicine, aqueous leaf extracts made by infusion or decoction have been utilized to cure ovarian and prostate malignant growth (Aziz *et al.,* 2014; Jenny *et al.,* 2011; Nam *et al.,* 2004). The aqueous extract of the plant has been used by Indian cultures to make rubefacient remedies and treat rheumatism, tumor, earache, fistula, tubercles, and whitlows (Aziz *et al.,* 2014; Jenny *et al.,* 2011). This plant has been employed in Sri Lanka as a bandage for snakebites (Dharmadasa *et al.,* 2016). Additionally, aqueous extract made by decoction has been used to treat hydrocele (Sikarwar *et al.,* 2008).

Phytochemistry. Numerous studies on the phytochemical screening of *C. latifolium* leaves, flowers, bulbs, and roots shows the presence of mainly isoquinoline alkaloids in the extract and non-alkaloidal constituents found are tannins, phenolic compounds, terpenes, flavones, glycosides, lectins, chalcones, coumarins, and other minor components. Alkaloids are thought to be the primary bioactive elements in *C. latifolium* that have pharmacological effects. Seven unique and structurally distinct isoquinoline alkaloids characteristic of the Amaryllidaceae family have been found from *C. latifolium*, namely lycorine-type alkaloid (represented by nine alkaloids, alkaloids 1-9); Homolycorine-type alkaloid represented by Hippeastrine10; Haemanthamine-type alkaloid (represented by seven alkaloids, alkaloids 11-17); galanthamine-type alkaloid represented by galanthamine18; tazettine-type alkaloid (represented by seven alkaloids, alkaloids 19-25); crinine-type alkaloid (represented by 23 alkaloids, alkaloids 26-48); and other miscellaneous alkaloids namely Augustamine49, Cherylline 50 Cripowellin C 51, 4,8-Dimethoxy-cripowellin C 52,9-Methoxy-cripowellin B 53, 4-Methoxy-8-hydroxy-cripowellin B 54, 4,8-Dimethoxy-cripowellin D 55 (Table 3). 14 non-alkaloid compounds isolated from the leaves, roots and bulbs of *C. latifolium* (compounds 1-14 in Table 4).

Table 3: Alkaloids isolated from constituents in *Crinum latifolium*.

Sr. No.	Alkaloid	Formula	Plant part	Reference
	Lycorine-type			
1.	Lycorine	$C_{16}H_{17}NO_4$	Leaves, Bulbs	(Ghosal *et al.,* 1983; Ghane*et al.,* 2018; Jeffs *et al.,* 1985; Kobayashi *et al.,* 1984)
2.	1-O-acetyllycorine	$C_{18}H_{19}NO_5$	Bulbs	(Kobayashi *et al.,* 1984)
3.	2-Epilycorine	$C_{16}H_{17}NO_4$	Flowers	(Noshita*et al.,* 2002)
4.	Pratorimine	$C_{16}H_{11}NO_3$	Bulbs	(Ghosal *et al.,* 1983)
5.	Pratorinine	$C_4H_7N_3O$	Bulbs	(Ghosal *et al.,* 1983)
6.	Pratosine	$C_{17}H_{13}NO_3$	Bulbs	(Ghosal *et al.,* 1983)
7.	Hippadine	$C_{16}H_9NO_3$	Bulbs	(Ghosal *et al.,* 1983; Nhung *et al.,* 2018)
8.	Oxoassoanine	$C_{17}H_{15}NO_3$	Leaves	(Tram *et al.,* 2002)
9.	2-Epipancrassidine	$C_{16}H_{17}NO_5$	Flowers	(Noshita*et al.,* 2002)
.	Homolycorine-type			
10.	Hippeastrine	$C_{17}H_{17}NO_5$	Bulbs, Leaves	(Jeffs *et al.,* 1985)
	Haemanthamine-type			
11.	3-Epicrinamine/Haemanthamine	$C_{17}H_{19}NO_4$	Bulbs	(Zhang *et al.,* 2009)
12.	Crinamine	$C_{17}H_{19}NO_4$	Bulbs	(Kobayashi *et al.,* 1984; Zhang *et al.,* 2009)
13.	Hamayne	$C_{16}H_{17}NO_4$	Bulbs	(Kobayashi *et al.,* 1984)
14.	11-O-Methylcrinamine	$C_{19}H_{21}NO_6$	Bulbs, Leaves, Roots	(Zhang *et al.,* 2009)
15.	3-O-Acetylhamayne	$C_{18}H_{19}NO_5$	Bulbs, Roots	(Kobayashi *et al.,* 1984; Zhang *et al.,* 2009)
16	Dihydro-oxo-demethoxyhaemanthamine	$C_{16}H_{17}NO_3$	Leaves	(Tram *et al.,* 2002)
17.	Delagoensine	$C_{18}H_{21}NO_5$	Bulbs, Leaves, Roots	(Zhang *et al.,* 2009)
	Galantamine-type			
18.	Galantamine	$C_{17}H_{21}NO_3$	Roots	(Ghane *et al.,* 2018)
	Tazettine-type			
19.	Latifaliumin A		Bulbs, Leaves, Roots, Flowers	(Zhang *et al.,* 2009)

20.	Latifaliumin A-N-demethyl		Bulbs, Flowers	(Zhang *et al.,* 2009)
21.	4a-Methoxyl-Latifaliumin A-N-demethyl		Bulbs, Leaves, Roots, Flowers	(Zhang *et al.,* 2009)
22.	12-O-Acetylated-Latifaliumin A		Roots	(Zhang *et al.,* 2009)
23.	12-O-aceyled-Latifaliumin A		Roots	(Zhang *et al.,* 2009)
24.	Latifaliumin B		Bulbs, Leaves, Roots	(Zhang *et al.,* 2009)
25.	Dihydro-Latifaliumin C		Leaves	
	Crinine-type			
26.	Crinine	$C_{16}H_{17}NO_3$	Bulbs,	(Kobayashi *et al.,* 1984)
27.	Buphanidrine	$C_{18}H_{21}NO_4$	Leaves	(Tram *et al.,* 2002)
28.	6α-Hydroxybuphanidrine	$C_{18}H_{21}NO_5$	Leaves	(Tram *et al.,* 2002; Hanh *et al.,* 2018)
29.	Filifoline	$C_{24}H_{24}N_2O_6$	Leaves	(Hanh *et al.,* 2018)
30.	Ambelline	$C_{18}H_{21}NO_5$	Bulbs, Leaves	(Ghosal *et al.,* 1983; Tram *et al.,* 2002; Hanh *et al.,* 2018)
31.	11-O-Acetylambelline	$C_{20}H_{23}NO_6$	Bulbs	(Ghosal *et al.,* 1983; Ghosal *et al.,* 1985)
32.	Powelline	$C_{17}H_{19}NO_4$	Bulbs, Leaves	(Kobayashi *et al.,* 1984; Tram *et al.,* 2002)
33.	6-Hydroxypowelline	$C_{17}H_{19}NO_5$	Leaves	(Tram *et al.,* 2002)
34.	11-O-1,2-β-Epoxyambelline	$C_{20}H_{23}NO_7$	Bulbs	(Ghosal *et al.,* 1985)
35.	1β,2β –Epoxyambelline	$C_{18}H_{21}NO_6$	Leaves	(Tram *et al.,* 2002)
36.	Undulatine	$C_{18}H_{21}NO_5$	Leaves	(Kobayashi *et al.,* 1984; Tram *et al.,* 2002; Hanh *et al.,* 2018)
37.	6α-Methoxyundulatine		Leaves	(Hanh *et al.,* 2018)
38.	6α-Hydroxyundulatine		Leaves	(Tram *et al.,* 2002; Hanh *et al.,* 2018)
39.	Crinamidine	$C_{17}H_{19}NO_5$	Leaves	(Tram *et al.,* 2002; Zhang *et al.,* 2009; Hanh *et al.,* 2018)
40.	6-Hydroxycrinamidine	$C_{17}H_{19}NO_6$	Leaves	(Tram *et al.,* 2002)
41.	6α-Methoxycrinamidine		Leaves	(Hanh *et al.,* 2018)
42.	Epoxy-3,7-dimethoxycrinane-11-one	$C_{18}H_{19}NO_6$	Leaves	(Tram *et al.,* 2002)
43.	*Crinum latine* A		Bulbs	(Tian *et al.,* 2021)
44.	*Crinum latine* B		Bulbs	(Tian *et al.,* 2021)
45.	Undulatine N-oxide		Leaves	(Hanh *et al.,* 2018)
46.	Crinumlatine C		Bulbs	(Tian *et al.,* 2021)
47.	Perlolyrine	$C_{16}H_{12}N_2O_2$	Leaves	(Hanh *et al.,* 2018)
48.	Crinane-3α-ol		Leaves	(Tram *et al.,* 2002)
	Miscellaneous			
49.	Augustamine	$C_{17}H_{19}NO$	Leaves	(Tram *et al.,* 2002; Hanh *et al.,* 2018)
50.	Cherylline	$C_{17}H_{19}NO_3$	Bulbs, Leaves	(Kobayashi *et al.,* 1984)
51.	Cripowellin C	$C_{25}H_{31}NO_{11}$	Bulbs	(Chen *et al.,* 2018)
52.	4,8-Dimethoxy-cripowellin C	$C_{26}H_{35}NO_{11}$	Bulbs	(Chen *et al.,* 2018)
53.	9-Methoxy-cripowellin B	$C_{26}H_{35}NO_{12}$	Bulbs	(Chen *et al.,* 2018)
54.	4-Methoxy-8-hydroxy-cripowellin B	$C_{25}H_{35}NO_{11}$	Bulbs	(Chen *et al.,* 2018)
55.	4,8-Dimethoxy-cripowellin D	$C_{26}H_{37}NO_{10}$	Bulbs	(Chen *et al.,* 2018)

Table 4: Non-alkaloidal constituents in *Crinum latifolium.*

Sr. No.	Constituent	Formula	Plant part	Reference
	Other metabolites			
1.	Hydrobenzoic acid	$C_7H_6O_3$	Leaves	(Ghane *et al.,* 2018)
2.	Glucan A		Roots	(Tomoda *et al.,* 1985)
3.	Glucan B		Roots	(Tomoda *et al.,* 1985)
4.	Lectin		Bulbs	(Kaur *et al.,* 2006)
5.	4-Senecioyloxymethyl-6,7-dimethoxycoumarin	$C_{17}H_{18}O_6$	Leaves	(Nam *et al.,* 2004)

6.	5,6,3'-Trihydroxy-7,8,4'-trimethoxyflflavone	$C_{18}H_{16}O_8$	Leaves	(Nam *et al.*, 2004)
7.	4',7-Dihydroxy-3'-methoxyflflavan (racemate)	$C_{16}H_{16}O_4$	Leaves	(Nam *et al.*, 2004)
8.	4',7-Dihydroxyflflavan (racemate)	$C_{15}H_{10}O_4$	Leaves	(Nam *et al.*, 2004)
9.	2',4',7-Trihydroxydihydrochalcone	$C_{15}H_{14}O_4$	Leaves	(Nam *et al.*, 2004)
10.	Latififine	$C_{17}H_{19}NO_3$	Leaves	(Kobayashi *et al.*, 1984)
11.	Cycloartenol	$C_{30}H_{50}O$	Leaves	(Nam *et al.*, 2004)
12.	Lupeol	$C_{30}H_{50}O$	Leaves, Roots	(Shukla *et al.*, 2018)
13.	Linoleic acid	$C_{18}H_{32}O_2$	Leaves, Roots	(Shukla *et al.*, 2018)
14.	Oleanolic acid	$C_{30}H_{48}O_3$	Leaves, Roots	(Shukla *et al.*, 2018)

Pharmacological activities. *C. latifolium* possesses extensive pharmacological potential to treat a wide range of human diseases. It is widely utilized as traditional medicines in a few indigenous systems of medicine like Ayurveda, Siddha and Unani. Many researchers have worked to prove the biological function of this plant including antioxidant, cytotoxic, antidiabetic, antitumor, anti-inflammatory, antimicrobial, anthelmintic, thrombolytic, analgesic activities.

The pharmacological potential of *C. latifolium* is extensive, and it can treat a wide range of human diseases. Several indigenous medical systems, including Ayurveda, Siddha, and Unani, use it frequently as folk medicines. Many researchers have worked to demonstrate the biological effects of this plant including antioxidant, cytotoxic, antidiabetic, antitumor, anti-inflammatory, antimicrobial, anthelmintic, thrombolytic, analgesic activities. The reported pharmacological activities of *Crinum latifolium* are given below in Table 5.

Table 5: Reported pharmacological activities of *Crinum latifolium*.

Sr. No.	Activity	Method	Plant part	Extract	Result	References
1.	Antioxidant	DPPH	Leaves	Aqueous, methanol	Aqueous extract had lower antioxidant activity than methanolic extract.	(Ghane *et al.*, 2018)
		DPPH	Leaves	Aqueous, ethanolic, alkaloid	Ethanolic extract had the highest antioxidant activity.	(Nguyen *et al.*, 2013)
		DPPH	Roots, aerial parts	Methanol	The antioxidant activity of methanolic extract of roots was higher than that of aerial parts.	(Shukla *et al.*, 2018)
		ABTS	Leaves	Aqueous, methanol	Aqueous extract of *Crinum laifolium* showed significantly higher activity than methanolic extract.	(Ghane*et al.*, 2018)
		FRAP	Leaves	Aqueous, methanol	Methanolic extract showed better antioxidant activity than aqueous extract.	(Nguyen *et al.*, 2013)
		β-CLAA	Leaves	Aqueous, ethanolic, alkaloid	Alkaloid extract exhibited negligible action while ethanolic extract shown strong antioxidant activity.	(Nguyen *et al.*, 2013)
		ORAC	Leaves	Aqueous	Extract showed potent antioxidant activity.	(Jenny *et al.*, 2011)
		DPPH	Aerial parts	Hydroalcoholic	The extract effectively scavenges several reactive oxygen species/free radicals in vitro.	(Kumar *et al.*, 2022)
2.	Cytotoxicity	PC3, LNCaP, BPH1	Leaves	Aqueous	Significant and dose-dependent inhibition of cell growth was reported by the extract.	(Jenny *et al.*, 2011)
		EL4-luc2	Leaves	Aqueous, alkaloid	Both extracts inhibited the proliferation of EL4-luc2 tumor cells.	(Nguyen *et al.*, 2013)
3.	Anti-inflammatory	PBMC	Leaves	Aqueous	The aqueous extract produced a strong anti-inflammatory effect.	(Jenny *et al.*, 2011)

		RAW 264.7 cell line	Leaves	Methanol	Extract showed strong nuclear factor-kappa B (NFκ-B) inhibition activity.	(Nam *et al.*, 2004)
		Carrageenan induced paw edema (rats), Dextran induced paw edema (rats), Histamine induced paw edema (rats), Granuloma test (rats)	Leaves	Aqueous	Extract showed good anti-inflammatory activity.	(Jeyabalan *et al.*, 2017)
4.	Antimicrobial	Escherichia coli	Leaves	Methanol	Extract exhibited strong antimicrobial properties.	(Rahman *et al.*, 2016)
		Staphylococcus aureus	Leaves	Methanol	Extract exhibited minimal antibacterial activity.	(Rahman *et al.*, 2016)
		Escherichia coli, Staphylococcus aureus, Bacillus subtilis, Agrobacterium tumefaciens	Leaves	Silver nanoparticles	Silver nanoparticles strongly inhibit all the bacterial strains.	(Zvetkova *et al.*, 2001)
5.	Anthelmintic	Pheretimaposthuma	Leaves	Methanol	Extract resulted in complete paralysis after 24 minutes and death after 46.4 minutes.	(Aziz *et al.*, 2014)
6.	Anti-diabetic	Iodine-starch assay. Dinitrosalicylic acid assay	Roots, aerial parts	Methanol	The extract of aerial parts of the plant possesses more antidiabetic potential in comparison to the extract of roots.	(Shukla *et al.*, 2018)
7.	Thrombolytic	Clot lysis assay	Roots	Methanol	Extract showed good thrombolytic activity.	(Dewan and Das 2013)
8.	Anti-tumor	Growth of left thoraco-abdominal Sarcoma type tumors (rats)	Leaves	Aqueous	The cold-hot aqueous extract of *Crinum latifolium* (L.), retards the in vivo growth of chemically induced tumors in rats.	(Zvetkova *et al.*, 2001)
9.	Analgesic	Acetic acid-induced writing (mice), Formalin induced paw licking (rats)	Leaves	Aqueous	Extract showed good analgesic activity.	(Jeyabalan *et al.*, 2017)
10.	Antiproliferative	Human prostate stromal cells (WPMY-1) induced by TGF-β	Leaves	Ethanolic	The extract exhibited significant antiproliferative activity against TGF-β-promoted prostate stromal cells (WPMY-1) in vitro.	(Thongphichai *et al.*, 2022)
11.	Antidepressant	Inhibition of [3h]-norepinephrine uptake	Whole plant	Methanol	The result suggested that *Crinum latifolium* extract may have potential as a natural antidepressant.	(Kishore *et al.*, 2022)
12.	Anti-obesity	Diet-induced obesity mouse	Leaves	Hydroalcoholic	The extract from the leaves of *Crinum latifolia* has anti-obesity qualities and can be used therapeutically to treat obesity.	(Nijhawan *et al.*, 2022)

[2, 2-diphenyl-1-picrylhydrazyl (DPPH); 3-ethylbenzthiazoline-6-sulphonic acid (ABTS) radical scavenging assays; β-carotene/linoleic acid assay (β-CLAA) Oxygen Radical Absorbance Capacity (ORAC); human carcinoma prostate cells (PC3); androgen sensitive prostate adenocarcinoma cells (LNCap); benign prostate hyperplasia cells (BPH1); murine lymphoma cell line (EL4-luc2); peripheral blood mononuclear cells (PBMC).]

CONCLUSIONS

It can be inferred from the facts presented above and compiled in this review that the plant *C. latifolium* has a wealth of therapeutic characteristics and is also employed in folk medicine, as described in numerous literature studies. These days, individuals are drawn in toward the plant-based drugs because of their less harmfulness and less expensive costs. The antioxidant, antibacterial, anti-diabetic, anti-cancer, and anti-inflammatory properties of *C. latifolium* have been demonstrated. The chemical components of *C. latifolium* are helpful in the creation of herbal medicines and may be used to treat a variety of clinical disorders.

FUTURE SCOPE

Medicinal plants are found all over the globe, and their therapeutic benefits, which are unknown in strength, may be helpful in treating a range of medical issues. The eastern Himalayas are a great trove of medicinal plants because of regional climatic variation and varied ecological habitats. *Crinum latifolium* hoped for a new

generation of medications because it is still unknown how novel treatments target intricate physiological and cellular responses. Traditional uses include treating tumors, diabetes, and arthritis. The aqueous extract of *C. latifolium* has demonstrated in vitro cytotoxic activity, and additional research utilizing various techniques is needed to investigate its activity on normal cells and assess any possible differences. For the creation of new herbal medicines to suit human needs, further study on this plant may be helpful.

Conflict of Interest. None.

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