

Chemistry and Medicinal Properties of *Hymenocallis littoralis*

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Abstract: Medicinal plants have bioactive compounds which are used for curing of various human diseases and also play an important role in healing. *Hymenocallis littoralis* has allelochemical importance such as defensive compounds, insect repellents, attractants, and their role in ecological balance. Medicinal plants have antifungal, antibacterial and anti-inflammation activities. *Hymenocallis littoralis* bulb, root and anther extracts possess a good antioxidant activity which can demonstrate a better cytotoxicity activity.

Keywords: Medicinal plants; Phytochemicals; Anti-fungal; Antibacterial; Anti-inflammation activities

1. Introduction

Natural herbs products (mainly herbal extract formulations) with anti-tumor effects have attracted much attention in pharmaceutical research. Medicinal plants besides therapeutic agents are also a big source of information for a wide variety of chemical constituents which could be developed as drugs with precise selectivity. These are the reservoirs of potentially useful chemical compounds which could serve as newer leads and clues for modern drug design [1]. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds [2]. Correlation between the phytoconstituents and the bioactivity of plant is desirable to know for the synthesis of compounds with specific activities to treat various health ailments and chronic diseases as well [3]. The traditional uses of medicinal plants in healthcare practices are providing clues to new areas of research and hence its importance is now well recognized [4]. *Hymenocallis littoralis* (Jacq.) Salisb commonly known as 'Spider Lily' is a bulbous, herbaceous plant from the family of Amaryllidaceae [5]. The plant is distributed by the sea and in swamps in tropical, sub-tropical, and temperate regions throughout the world. Throughout the history of *Hymenocallis littoralis*, several alkaloids had been discovered from its bulb. The first alkaloid lycorine was proven to have antineoplastic, cytotoxic and antiviral properties

2. Classification

Kingdom: Plantae
Clade: Angiosperms
Clade: Monocots
Order: Asparagales
Family: Amaryllidaceae
Subfamily: Amaryllidoideae
Genus: *Hymenocallis*
Species: *H. littoralis*



Figure 1: *Hymenocallis littoralis*

3. Botanical Description

Hymenocallis littoralis or the beach spider lily is a plant species of the genus *Hymenocallis*, native to warmer coastal regions of Latin America and widely cultivated and naturalized in many tropical countries.[6]

Spider lily is a bulbous, herbaceous plant. Leaves are fleshy, crowded, dark green and glossy, narrowly lanceolate, 0.5 to 1 meter long, 6 to 7 centimeters wide. Scape is erect, solid, somewhat compressed, about 0.5 meter tall, bearing at its apex few to many, sessile, umbellate flowers. The flowers are fragrant with the perianth-tube greenish below and whitish above, about 12 centimeters long, the lobes linear, white, and spreading, 10 centimeters long and 5 to 7 millimeters wide. The membranous cup connecting the filaments is white, funnel-shaped, 4 to 5 centimeters diameter. The anthers are green and erect.

Distribution

Cultivated as hedge in Manila and other large towns. Grows wild in waste places, through bulb reproduction. Found in a

broad range of growing conditions, from wet and boggy to dry areas

4. Chemistry of *Hymenocallis littoralis*

Hymenocallis littoralis (Amaryllidaceae), known locally as “Melongkecil,” is an ornamental and bulbous perennial herb. It has been traditionally used in Philippines as a vulnerary [7].

Plants in the Amaryllidaceae family were reported to contain alkaloids that are known to exhibit a wide range of pharmacological activities [8].

A number of alkaloids were isolated from the *Hymenocallis littoralis* such as lycorine, littoraline, hippeastrine, lycorenine, tazettine, pretazettine, macronine, homolycorine, lycoramine, vittatine, and haemanthamine [9].

These compounds were reported to possess various pharmacological effects such as antiviral, antiparasitic, anticancer, antibacterial, antioxidant, and wound healing [10, 11].

Lycorine, a pyrrolophenanthridine alkaloid, is one the major alkaloids found in *H. littoralis*

It displays strong antiviral effect against poliovirus, measles, and herpes simplex type 1 viruses [8]. Besides, lycorine also possesses potent antiretroviral [9], antimetabolic [10, 11], and cytotoxic activities [2]

5. Medicinal properties

Methylflavan / Antioxidant: Study isolated 7,4'-dihydroxy-8-methylflavan from the extract of *P. littorale* stem and assessed for its radical scavenging properties.[12]

- **Cytotoxicity:** A 1993 study isolated pancratistatin (PST) from *H. littoralis* which displayed potent cytotoxicity against a human tumor cell line. A recent study showed selectivity of PST to cancer cells and sparing of normal cells. This study investigated the anti-cancer efficacy and specificity of two PST-related natural compounds, AMD4 and AMD5. Results showed AMD5 had efficacy and selectivity similar to PST and AMD4 lacked apoptotic activity. The phenanthridone skeleton in natural Amaryllidaceae alkaloids may be a common element for selectivity against cancer cells.[13]
- **Anti-tumor:** The biologic activities of isocarbostryl alkaloids showed excellent in vitro and in vivo cytotoxicity against many tumor cell lines and high selectivity for cancer cells versus normal cells.[14]
- **Lycorine Alkaloids / Littoraline / HI Reverse Transcriptase Inhibition / Cytotoxicity:** Study isolated a new alkaloid, littoraline, with 13 other known lycorine alkaloids and one lignan. Littoraline showed inhibitory activity of HIV reverse transcriptase and lycorine and haemanthamine showed potent in vitro cytotoxicity.
- **Pancratistatin / Anticancer:** (1) The species serves as an effective source of pancratistatin, a powerful anticancer agent. Pancratistatin is primarily produced in the bulbs, to

a lesser extent, in the roots. The report describes a method for large-scale production. (2) Narciclasine was employed as precursor for synthetic conversion to natural (+) pancratistatin.

- **Alkaloids:** Phytochemical screening of bulbs and flowers yielded four alkaloids: lycorine, hippeastrine, 11-hydroxyvittatine, and (+)-8-O-demethylmaritidine, plus two flavonoids, quercetin, 3-O-glucoside and rutin. Study investigated the antimicrobial activity of a petroleum ether extract of the flowers.[15]
- **Narcistatin / Antineoplastic:** Human cancer cell line inhibitory isocarbostryl precursors were isolated from the bulbs of *Hymenocallis littoralis* from the horticultural production or reduction of narciclasine 1a-4 from the same source.[16]
- **Anti-Candida Activity:** Study evaluated the inhibitory activity of a methanol extract of various plant parts against *Candida albicans*. The flower and anther were effect at 6.25 mg/ml.[17]
- **Antimicrobial:** Study evaluated an aqueous extract against three organisms: *E. coli*, *S. aureus*, and *Candida albicans*. Varied concentrations showed inhibitory activity against all the tested organisms.
- **Antibacterial:** Ethyl acetate and methanol extracts of leaves, flowers, and stem barks showed antibacterial activity against *B. subtilis*.[18]

The bulbs are commonly employed as an ornamental plant and used in cosmetics preparation also.

6. Conclusion

The plant is rich in many phyto-constituents that are useful in drug designing. These studies place this indigenous drug a novel candidate for bioprospection and drug development for the treatment of such diseases Anti tumor, anticancer, antibacterial, antifungal cytotoxicity activity .several alkaloids had been discovered from its bilb*Hymenocallis littoralis* an ornamental and medical plant has been traditionally used for wound healing .

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