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PHYTOCHEMICALS AND PHARMACOLOGICAL PROPERTIES OF *HIPPEASTRUM VITTATUM:* A REVIEW

Akhilesh Singh[1]*; Santosh Kumar Shukla[2]

[1*]Research Scholar, Institute of Pharmaceutical Sciences and Research, Unnao, UP
[2]Associate Professor, Institute of Pharmaceutical Sciences and Research, Unnao, UP

Corresponding author:
Akhilesh Singh
[1*]Research Scholar, Institute of Pharmaceutical Sciences and Research, Unnao, UP

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ABSTRACT:
A growing number of people are turning to the plant genus Hippeastrum, which contains several alkaloids, as a remedy for neurological disorders and neurodegenerative diseases. It is composed of more than 70 species that can be found in tropical and subtropical areas of South America. The present review was based on the phytochemicals and pharmacological properties of *Hippeastrum vittatum*. There are roughly 75 different species of amaryllis, which were first introduced in the early twentieth century. Amaryllis bulbs, roots, and flowers have been the subject of much investigation in recent years, with both domestic and foreign researchers isolating extracts from a variety of chemical components. The novel alkaloids, tannins, glycosides etc. were discovered through analysis of an ethanolic fresh flower extract from *Hippeastrum vittatum* i.e., Vittacarboline, O-methylismine, Ismine, Lycorine, Crinine, Haemanthamine, Narciclasine, Galanthamine and Tazettine. It concluded that *Hippestrum vittatum* has been utilized in the cure and management of various disease conditions i.e., diabetes, depression, cancer, infections of parasites and Anti-Alzheimer's disease due to presence of diverse phytochemicals in the plant.

Keywords: *Hippeastrum vittatum*, chemical constituents, biological properties, anticancer, anti-diabetic.

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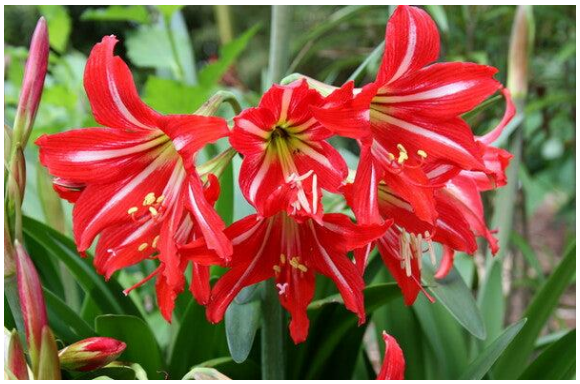
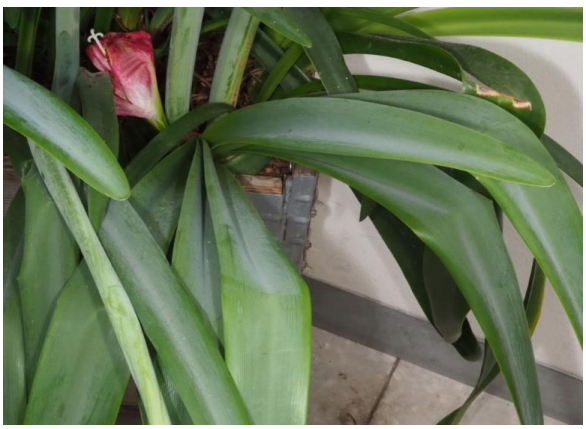
INTRODUCTION

A growing number of people are turning to the plant genus Hippeastrum, which contains several alkaloids, as a remedy for neurological disorders and neurodegenerative diseases [1]. It is composed of more than 70 species that can be found in tropical and subtropical areas of South America [2]. Hippeastrum plants came in a variety of hybrids, and most present commercial hybrids are descended from *Hippeastrum vittatum*.

The most widely grown amaryllis in the world, Hippeastrum vittatum, is native to Central and South America, Brazil, and Peru. It was first transported to Europe in 1633 from South Africa at the Cape of Good Hope [4]. Between the middle of the 19th century and the start of the 20th century, more than 50 Hippeastrum species were introduced to Europe. The Yangtze River in the south is the primary planting area for many of the current interspecific hybrid species, and many other potted ornamental [5]. There are roughly 75 different species of amaryllis, which were first introduced in the early twentieth century. Amaryllis bulbs, roots, and flowers have been the subject of much investigation in recent years, with both domestic and foreign researchers isolating extracts from a variety of chemical components [6][7]. It possesses numerous pharmacological properties- anti-cancer, anti-viral, anti-inflammatory etc.



a. Flower



b. Leaves

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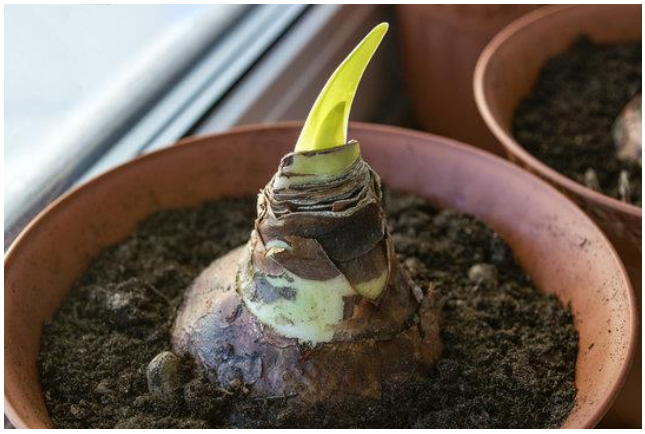

c. Germinating bulb

Fig 1. *Hippeastrum vittatum* plant

Taxonomy

Kingdom	: Plantae
Superorder	: Lilianae
Subclass	: Rosidae
Order	: Asparagales
Family	: Amaryllidaceae
Genus	: *Hippeastrum*
Species	: *vittatum*

Chemical constituents

The novel alkaloids, tannins, glycosides etc. were discovered through analysis of an ethanolic fresh flower extract from *Hippeastrum vittatum* [8]-

- Vittacarboline
- O-methylismine
- Ismine
- Lycorine
- Crinine
- Haemanthamine
- Narciclasine
- Galanthamine
- Tazettine

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Pharmacological properties

Anticonvulsant

Compounds obtained from various Amaryllidaceae species are becoming viable therapy alternatives for neurological illnesses and neurodegenerative diseases. Hippeastrum species, in particular, are a rich source of alkaloids with a diverse range of potential therapeutic applications. The behavioural and pharmaco-toxicological characterization of montanine a globally distributed ornamental shrub, is presented here. The LD_{50} of montanine in mice was 64.7 mg/kg for males and 67.6 mg/kg for females, respectively. Neurological illnesses and neurodegenerative diseases are increasingly being treated with compounds derived from several members of the Amaryllidaceae family. The alkaloids found in plants belonging to the genus Hippeastrum have a wide range of potential medical uses. According to the findings of Silva et al. (2006), montanine, possesses psychopharmacological actions such as anxiolytic, antidepressant, and anticonvulsive properties [9].

Anti-diabetic

A streptozotocin-induced diabetic rat model, the possible hypoglycaemic effects of crude mucilage from *Hippeastrum vittatum* bulbs were investigated at 150 and 250 mg/kg. These effects were likewise quite similar to those of gliclazide (50mg/kg), a commonly used hypoglycemic medication. The findings highlight the potential of water-soluble polysaccharide fractions from the plant for the production of natural hypoglycaemic medicines that could be useful as alternative therapy for type-2 diabetes [10].

Anti-Alzheimer's disease

Researchers have demonstrated that alkaloids, which are compounds isolated from natural sources, exhibit promise pharmacological activity, including pharmacological properties for the treatment of neurodegenerative illnesses like Alzheimer's disease, which is currently treated with a variety of medications [11].

Cyto-toxic

The sulphorhodamine B assay was used to assess the cytotoxic activity of dichloromethane and n-butanol extracts procured from fresh bulbs of Hippeastrum vittatum (Amaryllidaceae), collected in Southern Brazil, against five human cell lines (HT29 colon adenocarcinoma, H460 non-small cell lung carcinoma, RXF393 renal cell carcinoma, MCF7 breast cancer, and OVCAR3 epithelial ovarian cancer). Potential antiproliferative action was identified in both extracts. Lycorine, vittatine, and montanine were the three alkaloids that were separated from the CH(2)Cl(2) fraction. When the two remaining compounds were tested using the antiproliferative assay, the alkaloid montanine was shown to have the highest amount of cytotoxicity [12]

Antiparasitic

Antiproliferative and viability tests against T. cruzi epimastigotes were used to assess the antiparasitic activity. Assays for synergism were conducted with the Chou-Talalay technique.

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The inhibitory effects of BuChE and AChE were also evaluated. GC-MS analysis was utilised to determine the makeup of alkaloids. T. cruzi epimastigote multiplication was strongly inhibited by all extracts. Particularly noteworthy are the extracts from H. aglaiae, H. aulicum, and H. hybrid, which exhibited growth inhibition that was both powerful and complete, akin to that of benznidazole. Five species exhibited modest butyrylcholinesterase (BuChE) inhibition, whilst the H. reticulatum extract exhibited high AChE inhibitory activity. GC-MS was used to identify fifteen alkaloids. In terms of the synergism evaluation, the combination of benznidazole and montanine produced the strongest synergistic impact. It has been demonstrated that Argentinean hippeastrum species bulb extracts are a good source of cholinesterase inhibitors and antiparasitic alkaloids. Future research on the synergy between montanine and benznidazole suggests this combination as a possible treatment for Chagas disease [13].

Anxiolytic and antidepressant

Anxiety causes feelings of fear, dread, and unease. It can make you feel hot and flustered, tense, and cause your heart to beat rapidly. Emotional anxiety is more common among female adolescents than male adolescents. Suicide claims the lives of almost 700,000 individuals annually. Among people aged 15–29, suicide ranks as the fourth leading cause of mortality. Hydroalcoholic flower extract (HFE) of Hippeastrum vittatum was studied for its potential pharmacological effects on anxiety and depression in Wistar albino rats. The NBRI in the Lucknow area supplied the blooms of Hippeastrum vittatum, which were macerated in a hydroalcoholic solution (a mixture of ethanol and distilled water) for fifteen days while being gently stirred. The Actophotometer, FST, Light/Dark Arena Test, and Elevated Plus Maze (EPM) were used as parameters. When *Hippeastrum vittatum* was tested for its anxiolytic and antidepressant effects, it significantly reduced anxiety and depression in rats compared to the control group. *Hippeastrum vittatum* hydro-alcoholic floral extract (HFE) is a major anxiolytic and antidepressant herbal medicine. Successful evaluation of the plant-flower's mechanism of action allows for its beneficial application in the treatment of depression, mental agitation, and other neurological illnesses [14].

In-vitro micropropagation

In order to increase the reproduction rate and growth of Hippeastrum vittatum bulbs in vitro on MS basal medium, various quantities of methyl jasmonate, spermine, casein hydrolysate, or progesterone were tested in conjunction with 16mg/kg+ 4mg/l naphthalene acetic acid. Bulb fresh weight was maximum (1.23 g/bulblet) with 4 mg/l methyl jasmonate, whereas multiplication rate was highest (8.2 bulbs/explant) with 80 mg/l spermine. The longest leaves were produced by 20 mg/l of progesterone or 2.0 g/l of casein hydrolysate. Therefore, to get the most bulbs per explant while maintaining a moderate leaf length and bulb fresh weight, it is recommended to utilize 80 mg/l spermine in combination with 16 mg/l 2 iP + 4 mg/l NAA.

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Methyl jasmonate (4 mg/l) altered the chemical composition of the treated bulbs, with a change in the alkaloid type ratio and the quantity of compounds [15].

Table 1. Pharmacological activities of different parts of Lily

S. N.	Parts used	Pharmacological activity	References
1.	Montanine	Anticonvulsant, anxiolytic	[9]
2.	Flower, mucilage	Antidiabetic	[10]
3.	Alkaloids	Anti-Alzheimer's disease	[11].
4.	Caffeic acid, and pancratistatin	Cytotoxic	[12]
5.	Montanine	Anti-parasitic	[13]
6.	Leaves, flower	Antidepressant	[14]
7.	Methyl jasmonate, spermine	In-vitro micropropagation	[15]

CONCLUSION

It is fairly normal for people to experience depression, and for many, it is a persistent problem that interferes with work and family obligations. The motivation, energy, and pleasure needed to support and maintain social, marital, and parental interactions are entirely disrupted. It is a disease with many faces that can manifest at any age, be chronic or waxing and waning, and frequently coexists with a wide range of other problems, including anxiety disorders, substance abuse, and behavioural disorders. There is a lot of information on the prevalence and symptoms of depression in the general population, but less information is available on depression among parents and other carers. It is frequently held responsible for or a contributing factor in medical disorders.

It concluded that *Hippestrum vittatum* has been utilized in the cure and management of various disease conditions i.e., diabetes, depression, cancer, infections of parasites and Anti-Alzheimer's disease due to diverse phytochemicals of the plant.

FUNDING

Nil.

CONFLICT OF INTEREST

Authors declared for none conflict of interest.

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