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Review Article

A Comprehensive Review On: *Barleria Cristata Linn*. (Acanthaceae)

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ABSTRACT

Barleria cristata Linn. it's a plant belonging to the Acanthaceae family commonly referred to as Raktajhinti and VajraDanti. Its distribution is widespread across countries such as Nepal, India, Pakistan, Bangladesh and the rest of the tropics of Asia. Traditional practices have utilized this plant to treat a variety of health issues, including lung disorders, inflammatory conditions, tooth decay, anemia, and snakebites. Various chemical constituents, including triterpenes, phenolic compounds, flavonoids, and glycosides, have been identified within the plant. The pharmacological activities demonstrated by Barleria cristata Linn. include antioxidant, antiinflammatory, antifungal, antibacterial and antioxidant properties. A thorough examination of the literature provides foundational knowledge about the plant.

INTRODUCTION

Previously, plants were a significant source of therapeutic remedies. Indian literature, such as Ayurveda, provides ample evidence of the use of plant-based remedies in treating different human nurture. India has almost an 45,000 botanical species, and it is believed that many of these possess medicinal properties (1). 80% of the people still relying on traditional medicine due to their affordability, side effects, and faith in traditional medicine (2). Barleria cristata Linn., also known as 'Bluebell Barleria' or 'Philippine Violet', in Hindi is known as Raktajhinti and Kannada as spatika, mullu jaji, or gorate, in Bengali is called Jhinti, Jati (3,4,5,6). The Barleria genus is identified by its large outer and smaller inner segments, globose honeycomb pollen, and epidermal cells with double cystoliths. Barleria cristata Linn. commonly known as Philippine violet, is the type species of the genus Barleria and it belongs to the subgenus Barleria. Seven monophyletic groups are divided into subgenus Barleria: Cristata, Ovata, Crassa, Fissimura, Strigosa, Monticola and Chrysothrix. (7). Barleria cristata is a native of South Asia and India., is cultivated for its showy flowers and is found throughout the country in various forms, including white, pink, striped, and blue (7). Barleria Cristata

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Linn, a kind of shrub in the subtropics Himalayas, Sikkim, Khasi Hills, Central and South India, is studied due to its potential for treating diseases like anemia, toothache, cough, and inflammation swellings. The plant's chemical constituents include flavonoids type phenolic compounds, including apigenin, quercetin, quercetin-3-O-β-D-glucoside, naringenin, luteolin, and apigenin glucuronide (8). Barleria cristata, with its antioxidant activity, could protect these cells and cure hyperglycemia caused by alloxan, thus evaluating its antidiabetic and hypolipidemic properties (9). Others biological activities are present in B. cristata, such as hepatoprotective, anti-plasmodial, anti-inflammatory, antibacterial, antidiabetic, antioxidant activity. (10). Barleria cristata L, a group of around 300 species, primarily inhabits the Old-World tropics. Tanzania, Angola, Madagascar, and India are the major countries with high concentrations of diversity and endemism (11). B. cristata is highly valued in various ethnomedical systems for its potential in treating various diseases, particularly lung disorders and inflammatory conditions (12).

DESCRIPTION OF THE PLANT (13)

Botanical name	Barleria cristata Linn
Family	Acanthaceae
Common name	Philippine violet, Bluebell Barleria
Part used	Whole plant especially leaf

TAXONOMIC CLASSIFICATION (14,15)

Domain	Eukaryote
Kingdom	Plantae
Phylum	Spermatophyte
Subphylum	Angiospermae
Class	Dicotyledonae
Order	Scrophulariales
Family	Acanthaceae
Genus	Barleria
Species	cristata

Barleria cristata is a 2m tall perennial subshrub with branched stems, covered leaves, and axillar inflorescences. Its corolla is a purplish-blue tube, and its ovary is ellipsoidal with a linear style and four seeds. Acanthaceae is a flowering plant family with 220 genera and 4000 variety of species, while Barleria is a huge polymorphic genus of herbs, shrubs, and rarely climbers. (16)

MORPHOLOGY

Barleria cristata L. is a large, everlasting shrub that grows in fertile, well-drained soil with full sun, or partial shade. Its stem consists of appressed trichomes and dense hairy nodes, and its leaves are 2.5-10 cm long, elliptic lanceolate, and dark green. Its flowers are whitish pink and have dense, ovoid spikes (17). The plant has a persistent, green, ovate-lanceolate calyx, a slender-tubed corolla, and flowers with four stamens, anthers, and staminodes. The ovary has two ovules, a terete style, and a pink stigma. The seeds are ovate, compressed and silky appressed hairy. The flowering and fruit season in the Indian subcontinent falls from September to February. (18)

Fig 1: Photo Of Barleria Cristata L. Taken In Bhimtal, Uttarakhand

TRADITIONAL USES

It fulfills several conventional functions and has other advantages. The entire plant, or a particular part (leaf, stem, root, bark, and flowers) have been used to treat a variety of conditions, including fever, jaundice, ulcers, inflammation, glandular swellings, hepatic obstruction, stomach problems, and boils (19). The root paste is also used topically. Cardiovascular disorders, diabetes, fever, snakebite, TB, flatulence, bronchitis, asthma,

cough, wounds, burns, gingivitis, nocturnal ejaculation, and hepatoprotective conditions are all treated with whole plant juice. It is regarded as a very valuable medicinal plant, particularly for treating respiratory conditions like tuberculosis, bronchitis, asthma, and cough (20). Sahariya communities from central India uses the seed paste for snake bite wounds and Jaintia tribes of Assam uses decoction of ariel part for skin infection. The entire plant boiled in water used to treat cold and flu. (21,22,23,24).

PHYTOCHEMISTRY

Polyphenols –

Fruits, vegetables, cereals, and drinks all contain polyphenols, which are naturally occurring antioxidants that are vital for human health and illness prevention by warding off UV rays and pathogen aggravation (2, 25).

Phenolic acid - Antioxidants and active forms of vitamin E, a-tocopherol and p-coumaric acid, are found in B. cristata leaves. They lessen LDL peroxidation, enhance probiotic efficaciousness, and inhibit free radical chain oxidation. P-coumaric acid is essential to human health because of its anxiolytic, antihyperglycemic, antiplatelet, and antimelanogenic properties (26).

Flavonoid's –

B. cristata leaves contain flavonoids, which are polyphenolic chemicals having anti-inflammatory, antioxidant, and anticarcinogenic properties. These substances include luteolin and 7-methoxy luteolin (27).

Glycoside –

The study reports the identification of iridoidal glycosides from B. cristata leaves, such as barlerin and shanshiside methyl ester. Desrhamnosylacteoside, acteoside, and poliumoside are examples of these phenylethanoid glycosides. They exhibit a range of pharmacological activity, like antiviral, antifungal, immune-suppressive, antiproliferative, and pain relieving properties (28).

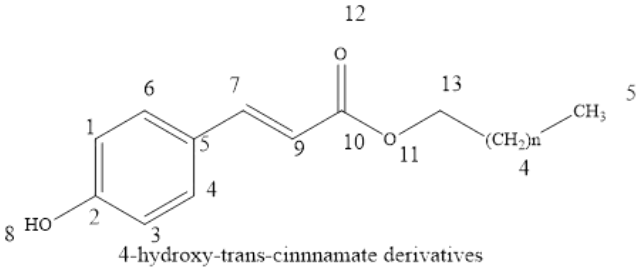
Triterpenes –

The plant was found to contain oleanolic acid, a triterpene that has been shown to possess antiinflammatory, hepatoprotective, anticancer, antibacterial, antiulcer, hypoglycemic, anti-cariogenic, antifertility, and anti-hyperlipidemic qualities (29).

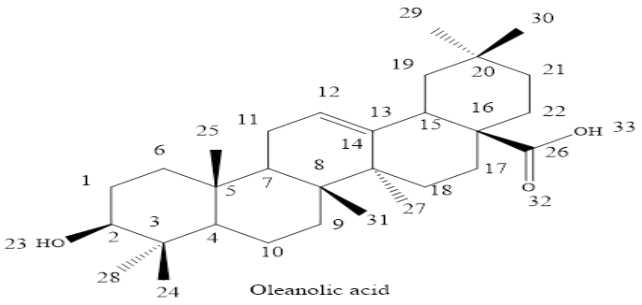
Aromatic compound –

Aromatic chemicals derived from plants primarily serve as a barrier against infections and insects. From the entire B. cristata plant, aromatic compounds such as 4-hydroxy-trans-cinnamate derivatives have been discovered (30).

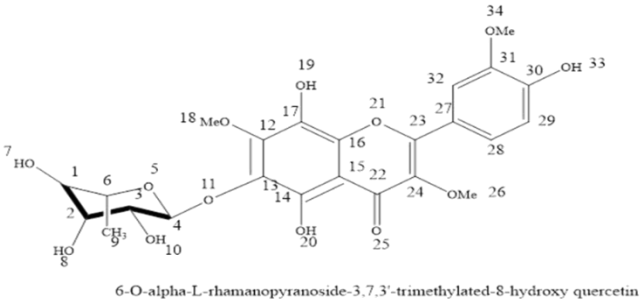
List of the compounds isolated from Barleria cristata Linn. (31,32,33)



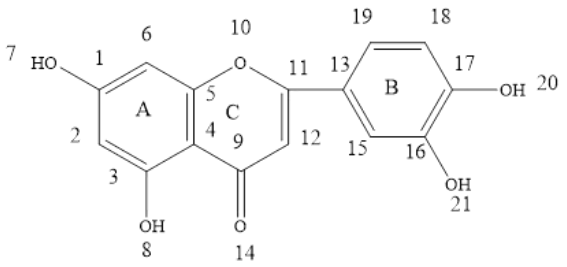
4-hydroxy-trans-cinnnamate derivatives



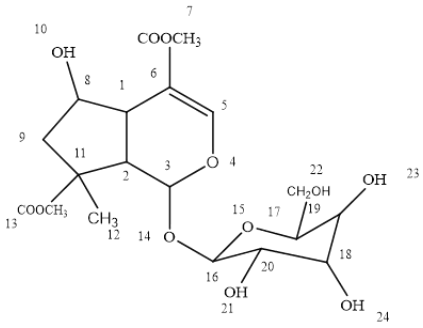
Oleanolic acid



6-O-alpha-L-rhamanopyranoside-3,7,3'-trimethylated-8-hydroxy quercetin



Luteolin or 2-(4,5-dihydroxy phenyl)-5,7-dihydroxy-4H-chromen-4one



Barlerin or dimetrhyl5-hydroxy-7-methyl-1-((2R,3S,4S,6S)-3,4,5-tridroxy-6-(hydroxymethyl)tetrahydro-2H-pyran-2-yloxy)-1,4a,5,6,7,7a-hexahydrocyclopetan[C]pyran-4,7-dicaroxylate

PHARMACOLOGICAL ACTIVITY

Anti-bacterial activity –

At concentrations of (0.025–0.095 mg/ml), B. cristata extracts prepared with ethanol, chloroform, and ethyl acetate shown antibacterial efficacy against four types of pathogenic bacteria. The ethanolic extract was the most active among these extracts, exhibiting high inhibitory action against Bacillus subtills, Streptococcus mutans, and Staphylococcus aureus, with the exception of E.coli, whose zone of inhibitions ranged from 28 to 15 mm, with the least amount of inhibitory concentration, the extracted flavonoids significantly, inhibited the majority of bacterial strains. The four species whose growth was most severely suppressed by gossypetin-8-methyl ether had the lowest minimum inhibitory concentration in those areas (34). The pure saponin fraction of leaves exhibited noteworthy antibacterial activity, as reported by Amutha and Doss. Bhaska used the disc diffusion test to find antipathogenic activity of a low concentration of ethanolic leaf extract against, Salmonella typhimurium, Micrococcus luteus, and Trichophyton rubrum. Significant antibacterial activity has also been demonstrated in a recent work employing B. cristata leaf extract gold nanoparticles. It has long been known that B. cristata juice can treat tuberculosis (35).

Anti-inflammatory activity –

Using histamine induced rat paw edema, the considerable anti-inflammatory efficacy of the methanolic extract of Barleria cristata leaves both in vitro and in vivo. In a rat paw edema animal model caused by histamine and serotonin, maximal inhibition was shown with methanol and aqueous extract. Furthermore, prostaglandin mice with castor oil-induced diarrhea showed inhibitory efficacy at a higher dose of aqueous leaf extract 500 mg/ kg. The administration of methanolic extract and aqueous extract at a concentration of 500 mg/kg, there was a significant suppression of the vascular permeability effect (36).

Anti–hyperglycemic Activity-

In diabetic rats, oral administration of B. cristata seed alcoholic extracts for seven days considerably lowers blood glucose levels. In streptozotocin induced diabetic rats, the ethanolic leaf extracts also exhibits hypoglycemic effects, normalizes the serum glycemic profile, preserves antioxidant levels, and reduces lipid peroxidation. Additionally, it boosts the inhibitory action of the enzymes alpha-glucosidase and alpha-amylase (37).

Anti-oxidant Activity-

According to the in-vitro investigation, the leaf extract exhibits antioxidant activity against the radical scavenging assays of 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,20 -azinobis-(3-ethylbenzothiazoline-6-sulfonic acid), and 2,4,6-tripyridyl-s-triazine (TPTZ). The in-vitro antioxidant activity of the ethanolic extract was higher than that of the aqueous extract. Significant antioxidant activity was found in the acetone extract and the methanol extracts of the bark (38).

Anti-fungal activity –

In comparison to clotrimazole, the pure saponin fraction from B. cristata leaves demonstrated a

notable antifungal activity. Just Aspergillus Niger (with a maximum zone of inhibition of approximately 6 mm in diameter at 1 mg/ml, was more susceptible than the other five fungal species (Candida albicans, Aspergillus flavus, Penicillium spp, Aspergillus niger, and Trichophyton) (39).

CONCLUSION

The current review endeavors to compile the botanical characteristics, phytochemistry, ethnomedicinal applications, and Phyto-pharmacological research on Barleria cristata. Despite the scientific evidence supporting the medicinal attributes of B. cristata, there are still diverse knowledge gaps regarding its applications. The first gap is the need in order to standardize the use of B. cristata and establish a basis for developing new medicinal products from this plant, further pharmacotherapeutic studies will be carried out on its raw material extracts and phyto constituents. For pure isolates of B. cristata, studies are needed to assess their effectiveness and potential side effects, as well as to evaluate their individual or Combined actions based on the active principles in this plant. These investigations should be conducted prior to the adoption of their use in clinical practice. We hope that this study can be a beneficial for future prospective of research.

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