ISSN No:-2456-2165

A Review on Pharmacological and Phytochemical Activities of *Lilium polyphyllum* (Liliaceae): Himalaya Lily

Kunal Bera, Parag Ghosh*, Soumyadip Halder, Nilesh Naskar, Subhadip Bhowmik,
Susobhan Mondal, Ankita Bairagi, Anjushree Purkait
School of Pharmacy, The Neotia University, Jhinga, Sarisa, Diamond Harbour Road, 24 Parganas(South),West Bengal – 743368

Abstract:- Nature has always been a supreme source for many therapeutic compounds yielding us with many microorganisms producing beneficial chemicals and medicinal plants. The herbal or medicinal plant is used to heal & treat different human diseases from ancient times. In the current era, people suffering from numerous diseases and taking synthetic drugs, which show several side effects and damage our precious body by life-threatening diseases. The main goal of this review article is to highlight the different phytochemicals & pharmacological activities of *Lilium polyphyllum* based on various scientific literature surveys. The common name of *Lilium polyphyllum* is "White Himalaya lily" which belongs to the family Liliaceae.It is marked as a precious plant of the Indian system of medicine. It is mainly found in different states of North and West-India, USA, Italy, Russia, UK, France, Spain, Germany, Chinaetc. Phytochemical studies showed that *Lilium polyphyllum* is a rich source of different active chemical constituents like alkaloids, furocoumarins, flavonoids, *O*-isopentenyl, halfordinol, glycoside, etc. Major pharmacological activities and steroid glycerides presented by this plant are anti-inflammatory activity, anti-tumor, anti-depression, anti-bacterial and also used to treat hyperdipsia, haematemesis, intermittent fever,bronchitis, rheumatology& general disability etc. Therefore, it can be concluded that "*Lilium polyphyllum*" may be considered as a natural source of many pharmacologically active constituents and useful for the development of herbal formulations.

Keywords:- *Lilium Polyphyllum, Bronchitis, Anti-Inflammatory, Anti- Bacterial.*

I. INTRODUCTION

There are roughly 110 species of herbaceous perennials in the genus Lilium (family Liliaceae), which has been divided into 5-10 divisions or subgenera.[1].Scattered over the northern hemisphere's cold and temperate zone. In Jammu & Kashmir, Himachal Pradesh, and Uttarakhand, it is dispersed sparingly [2]. The genus is significant in the global flower industry because of its diversity and the enormous number of commercially available hybrids and cultivars. However, several species are also valued as foods and medicines [3,4] could greatly boost the economic relevance.

Bulb plants from the genus Lilium, such as *L. Polyphemus, L. lancifolium, and L. candidum,* have a high therapeutic potential. Bulbs have calming, astringent, and anti-inflammatory qualities in medicine. The remedy is utilized for cough, bronchitis, seminal weakness, strangury, burning feeling intermittent fever, haematemesis, and overall incapacity. It also functions as a refrigerant, galactogogue, expectorant, aphrodisiac, diuretic, antipyretic, and tonic. [5] The bulbs are also utilised in chyawanprash and a night cream that promotes vigour. [5] Raw bulbs are consumed in high altitudes to combat the cold. The species was said to rapidly restore health and act as an antioxidant in the body in conventional medicine. [6] The chemical components of the genus *Lilium* have been the subject of several research that have demonstrated their pharmacological effects on cancer, diabetes, bacteria, inflammation, blood lipids, depression, tiredness, and hypoxia tolerance. In order to provide a more in-depth understanding of the therapeutic qualities of the plant as a pharmacopoeial species, the review in this work aims to give a thorough and critical evaluation of the chemical, botanical, and pharmacological features of *Lilium* hybrids.

II. METHOD

In order to find pertinent material, a variety of electronic and scientific search engines and specialized reference tools were employed, including Google Scholar, Web of Science, scientific literature, publishing websites, and electronic databases. In order to gather comprehensive information on the therapeutic applications of the herb liium, a systematic search was also conducted in online research libraries like E-library and particular pharmaceutical publications.

III. FINDINGS

A. Botanical Characteristics

From Europe to North Asia, the Liliaceae family of plants includes the Lilium plant. The "white lily" is a herbaceous bulbous perennial plant that can only be found in its natural environment in the Himalayan area. [7] It may be discovered in the high-altitude, arctic regions of Afghanistan, Pakistan, Nepal, and India. [8] For its modest and lovely blossom, the lily species is artificially grown. The ground rosette gives rise to the lance-shaped leaves. Up to 150 cm tall, the stem bears straight, heavily overgrown leaves. The flowers have a lovely scent and can grow up to 10 cm in size. On a single stalk, there might be up to 15 blossoms. In June

ISSN No:-2456-2165

and July blooms fruits come in capsule form. Scale leaves generally grow in concentric layers on bulbs, starting from a basal disc. *L. polyphyllum's* bulb has linalool and -terpineol in it. [9]

B. Composition of Biologically –Active Compounds

There hasn't been much research done on the Lilium's chemical makeup thus yet. Extracts of flowers, roots, and bulbs were used to separate a variety of biologically active compounds. It has been proven that the plant has alkaloids in every section, as well as saponins and flavonoids in the aerial portions. Proteins, vitamins, sugar, and boron are all present in considerable quantities in the bulbs. [10] Mostly the flavonoids (Quercetin, Kaempferol,isorhamnetin,) [11] However, carotenoids, steroidal alkaloids, pyrrole alkaloids (lilalin, jatrophan), steroids (beta-sitosterol), and steroid saponins of the furostane and spinostane types, tannins, polysaccharides, organic acids, and amino acids are some of the other significant bioactive compounds. [12] The members of the genus *Lilium* provided the steroidal saponin chemicals. [2] From the plants *L. candidum and L. longiflorum*, respectively, the steroidal alkaloids and further steroid glycoside alkaloids were discovered. [13] According to TLC examination of plants at various vegetative stages (during initial growth period, throughout growth, at the commencement of blooming and flowering stage) in the spring-summer period, the subterranean and aerial sections of the plant collect -methylene glutamic acid at the highest concentration. [14]

C. The pharmaceutical properties of Lilium

The stems, leaves, flowers, and bulbs of Lilium species are utilised as raw materials for pharmaceuticals. The juice of *L. martagon* is used to treat stomach ulcers and exterior wounds. The *L. candidum* is a similarly old plant that is utilised in China as a significant culinary plant and as a significant biomedicine to treat the symptoms of numerous inflammatory diseases in humans [15] and they are grown as decorative plants all throughout the world. Since the dawn of time, this plant has assisted in the treatment of inflammatory and suppurative wounds, ulcers, skin inflammations, burns, and other disorders. [16] The formulations made by *L. Martagon* are used to treat gynaecological illnesses because they contain anti-inflammatory, sedative, analgesic, and hemostatic qualities. Lily bulbs are frequently used as potent anti-hemorrhagics and to cure bladder and rectum discomfort. Gallbladder conditions are treated with the flower infusion. [17] In addition, *L. martagon* is well known for its usage in the treatment of malignancies. Extracts of L. martagon are helpful for skin whitening and inhibiting melanin formation in the skin's epidermal layers. The medicinal benefits of Lilium are widely recognised as an anti-inflammatory treatment for burns and ulcers, as well as a proven method of delaying the healing of wounds. [18] The anti-inflammatory benefits of lilies are likely caused by a variety of steroids and steroid glycosides. [19] Fresh *L. candidum* bulb saponins of spirostanol and furostanol were extracted. [20] L. lancifolium root extracts have anti-inflammatory properties. [21] In order to demonstrate the anti-inflammatory impact, the anti-inflammatory mechanisms inhibited the generation of inflammatory components. According to these findings, liaoum plants may have therapeutic benefits for the treatment of inflammatory illnesses. In Chinese medicine, the bulbs of Lilium species, such as *L. brownii and L. lancifolium*, are utilised as anti-tumor herbs. According to the results, [22] *L. candidum* extracts cause apoptosis to be stimulated, which in turn causes cytotoxicity in human breast cancer cells. According to the study, [23] the polysaccharide and which improves immune function in H22 tumour development may be responsible for the anti-tumor actions. These results demonstrate the possible anti-tumor effects of the crude extracts and certain active components from *L. brownii*, *L. lancifolium*, and *L. candidum.* The *L. lancifolium* bulb extracts shown strong antioxidant capability and may represent a natural source of antioxidants. According to a research, [15] the phenolic compounds isolated from *L. lancifolium* bulbs shown potent antioxidant and free radical scavenging properties. The research has demonstrated that the methanol extracts of *L. candidum* flower contain certain active compounds with the ability to protect the liver. [24] The bulbs of *L. davidii, L. leucanthum, L. regale, L. brownii*, and *L. lancifolium* were linked to beneficial compounds such alkaloids, flavanoids, and saponinsbased on their antibacterial action. [25] The antibacterial activity and the components of lily bulb extracts had a strong dosage effect relationship. The findings also indicated that the antibacterial activity rose proportionately as the amount of lily bulb extracts increased. [25]

ISSN No:-2456-2165

Compound	Medicinal Uses	References
Kaempferol	Anti-apoptotic, pro-wound healing, anti-cancer, cardioprotective, anti-oxidant, pro-apoptotic, anti-allergic, anti-parasitic, anti-diabetic, anti-adipogenic, anti-thrombotic, anti-inflammatory, anti-metabolic syndrome, anti-bacterial, immunoregulatory, hepatoprotective, anti-atherosclerosis	[26-33]
Linalool	Anti-parasitic, anti-convulsant, anti-cancer, anti-bacterial, neuroprotective, anti-oxidant, anti-inflammatory, anti-Alzheimer, anxiolytic, hepatoprotective, anti-hyperalgesic, neuroprotective	[34-41]
Citronellal	Anti-fungal, insect repellant, hepatoprotective, anti-nociceptive, anti-inflammatory, anti-bacterial	[42-44]
Caryophyllene	Anti-cancer, anti-mutagenic, anti-bacterial, oxygen deprivation protective, neuroprotective, hepatoprotective, anti-convulsant, anti-diabetic, anti-microbial, anti-Alzheimer, pro-longevity, analgesic, nephroprotective.	[45-54]
Humulene	Inseccidal, anti-cancer, anti-inflammatory	[49, 55, 56]
Neridiol	Anti-parasitic, antioxidant, neuroprotective, pro-wound healing, anti-microbial	[57-60]

Table 1:- Phytochemicals found in *Lilium polyphyllum* have medicinal potential.

IV. CONCLUSION

The herbaceous perennial *Lilium*, which has fragrant blossoms, is used in both conventional and contemporary medicine to treat a variety of physiological ailments. A variety of bioactive compounds, including saponins, flavonoids, alkaloids, aminoacids, and polysaccharides, are present in the plant. That has sedative, analgesic, antitumor, anticancer, and anti-inflammatory properties. It is still to be determined the therapeutic effects of many chemically varied substances extracted from *Lilium*, and the mechanism is still being further confirmed. In order for *Lilium* to quickly establish itself as one of the health research oriented programmes, it is necessary to investigate the relationship between the chemical makeup of various bioactive substances found in *Lilium* and their pharmacological effects in healthcare products. Related drugs should also be thoroughly researched.

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