A review of recent research on therapeutic properties of Asiatic Lilium hybrid

GP Panda, CR Mohanty and L DIP

Abstract
The genus Lilium in the Liliaceae family was cultivated and has been used for different purpose like ornamental plants throughout the world, as well as important edible plants and biological medicinal products. The petals, roots and bulbs of the plant contain many bioactive compounds; many of them could also find their place in modern medicine. The active ingredients of genus Lilium mainly contain flavonoids, alkaloids, soluble polysaccharides and steroidal saponins. The therapeutic properties of Lilium include anti-tumor, anti-inflammatory, diuretic, anti-bacterial, anti-depression and expectorant. It is recommended in the form of herbal tea to prevent various gynaecological disorders, associated with menstruation as well as against insomnia, anxiety, sinusitis, dry cough, asthma, and cardiac arrhythmias. The plant is mainly applied externally to the skin for the treatment of skin ulcers, rashes, burns, wounds, eye-irritation and inflammation. The present study has been attempted to explore the therapeutic effects of Asiatic Lilium hybrids as an herbal remedy.

Keywords: Lilium, therapeutic effects, chemical compounds

Introduction
The genus Lilium (family Liliaceae) includes approximately 110 species of herbaceous perennials, which has been classified into 5 to 10 sections or subgenera (Mabberley, 2008) distributed throughout the cold and temperate region of the northern hemisphere. In India it is distributed in a few pockets in Jammu and Kashmir, Himachal Pradesh and Uttarakhand (Ved et al., 2003) [23]. The importance of the genus in the world flower market is due to diversity and large number of hybrid and cultivars commercially available. However, some species are also known for medicinal and food value (Chang et al., 2000; Dhyani, 2007) [2, 4] which increase the economic importance many folds.

Medicinally, bulbs of the genus Lilium plants have a quite high medicinal value such as L.polyphylum, L.lancifolium and L. Candidum. Medicinally bulbs posses soothing, astringent and anti-inflammatory properties. The preparation are used as refrigerant, galactogogue, expectorant, aphrodisiac, diuretic, antipyretic and tonic, and in cough, bronchitis, seminal weakness, strangury, burning sensation intermittent fever, haematemesis and general disability (Rana and Samant, 2011) [10]. The bulbs are also used in revitalizing night cream and in chyawanprash (Rana and Samant, 2011) [10]. Bulbs are eaten raw to get the relief from cold in high altitudes. In traditional system of medicine the species reported to restore health immediately and work as antioxidant in the body (Sharma & Balkrishna, 2005) [19].

Many studies have been conducted for the chemical constituents of the genus Lilium, which illustrated their pharmacological effects of anti-tumor, hypoglycæmic, anti-bacterial, anti-inflammatory, hypolipidemic, reducing blood lipid, anti-depression anti-fatigue and hypoxia tolerance. In this paper, the review is intended to provide a comprehensive and critical evaluation of the chemical, botanical, pharmacological aspects of Lilium hybrids, with a view to facilitating further in depth therapeutic properties of the plant as pharmacopeial species.

Methods
Diverse electronic and scientific search engine and specialized reference tools such as Google Scholar, web of science, scientific literature, publishing sites, and electronic database were used in the search for relevant literature. In addition, a systematic search in online research libraries such as E-library and specific pharmacological publications was carried out in order to get exhaustive data on the medicinal uses of Lilium as an herbal remedy.
Findings

A. Botanical Characteristics
The plant of *Lilium* in the Liliaceae family are distributed in the area from Europe to North Asia. The habitat of “white lily” is a herbaceous bulbous perennial plant is restricted to its native habitat in the Himalayan region (Rana & Samant, 2010) [15]. It is found in high altitude cold zones of Afghanistan, Pakistan, Nepal and India (Dhyani et al., 2012) [3]. The species of lily is cultivated artificially for its modesty and beautiful flower. The lanceolate leaves grow from the ground rosette. The stem has straight, densely overgrown leaves and grow up to 70-150cm in height. The flowers are up to 10 cm in size, bright white and smell great. Up to 15 flowers are arranged on one stem. Blooms in June and July. The fruits are capsule. Bulbs mainly have concentric layers of scale leaf arising from a basal disc. The bulb of *L. polyphyllum* contains linalool and α-terpineol (Balkrshna et al., 2012) [11].

B. Composition of Biologically –Active Compounds
The chemical composition of the *Lilium* has so far not received much research attention. Many biological active substances were isolated from extract of flower, root and bulbs. The presences of alkaloids in all parts of the plant as well as saponins and flavonoids in the aerial parts have been established. The bulbs contain large amount of proteins, vitamins, sugar, and boron. (Kucherov, 1990) [9]. The flavonoids mainly (Quercetin, isorhamnetin, Kaempferol) (Tappi and karrer, 1949) [21], but the other important bioactive substances are carotenoids, steroid alkaloids, pyrrole alkaloids (lilalin, jatrophan), steroids (beta-sitosterol) and steroid saponins of furostane and spinostane type, tannins, polysaccharides, organic acid and amino acid (Haladova et al., 1991) [7]. The steroidal saponin compounds have been obtained from species of the genus *Lilium* (Zhou et al., 2010) [23]. The steroidal alkaloids and another alkaloids of steroid glycoside were found from *L. candidum* and *L. Longiflorum* respectively. (Mimaki and Sashida, 1991). The underground and aerial parts of the plant γ-methylene glutamic acid is accumulated at the highest concentration, as revealed from TLC analysis of plants at different vegetative periods (at initial growth period, during growth, at the beginning of flowering and flowering stage) in the spring-summer period (Rossetti, 1981) [18].

C. The pharmaceutical properties of *Lilium*
The bulbs, stems, leaves and flowers of *Lilium* species are used as medicine raw materials. The juice of *L. martagon* is used for the healing of external wound and stomach ulcers. The *L. candidum* is also an ancient plant which is used as an important edible plant and important biomedicine in china to alleviate the symptoms of various human inflammatory disease (Jin et al., 2012) [8] and they are cultivated as an ornamental plant throughout the world. This plant helped from time immemorial in the treatment of inflamed and suppurrative wounds, ulcers, skin, inflammations, burns and various injuries (Pieroni, 2000) [14]. The preparations of L. Martagon have anti –inflammatory, sedative, analgesic and haemostatic properties and are used for treating gynaecological diseases. Lily bulbs are widelysed for treating inflammation of the rectum and bladder, and as effective anti-hemorroidal agents. The flower infusion is used for treating gallbladder diseases (Znamensky, 1932) [24]. Moreover, *L. martagon* is popular for its used in treating cancers (Hatwell, 1967). Extracts of *L. martagon* are beneficial in the inhibition of melanin synthesis in the skin epidermal tissues and also for skin lightening (Mahmood, 2016).

The therapeutic effects of *Lilium* is well known as anti-inflammatory remedy for ulcers and burns and it is also proven means against healing of wounds (Rasoulinzehad et al., 2019) [17]. Many steroids and steroid glycosides are likely to be responsible for anti-inflammatory effects of lilies (Munafo et al., 2010) [13]. Spirostanol and furostanol saponins were isolated from the fresh bulb of *L. candidum* (Mimaki et al., 1999) [12]. The root extracts of *L. lancifolium* had anti-inflammatory effects (Kwon et al., 2010) [10]. So the anti-inflammatory mechanisms were the inhibitory effect of inflammatory factors production to show the effect of anti-inflammation. These data suggested that *Lilium* plants may be potential therapeutic effects for the treatment of inflammatory diseases.

The bulbs of *Lilium* plants including *L. brownii* and *L. lancifolium* are used as anti-tumor herbs in Chinese medicine. Results of (Tokgun et al., 2012) [22] indicate that *L. candidum* extracts have cytotoxic effects on human breast carcinoma cells, that this cytotoxic effect comes from Fp3-mediated stimulation of apoptosis. The study of (Han and xie, 2013) [6] revealed that the anti-tumor effects may be due to the polysaccharide and which enhances immune function in H22 tumor growth. From these finding it can be seen that the crude extracts and some active constituents from *L. brownii*, *L. lancifolium*, and *L. candidum* exhibited potential anti-tumor effects.

The bulb extracts of *L. lancifolium* had significant antioxidant capacity and could be a potential nature source of antioxidants. The study of (Jin et al., 2012) [8] has revealed that the phenolic compounds extracted from bulbs of *L. lancifolium* showed strong anti-oxidant capacity and free radical scavenging capacity.

The study of (Devi et al., 2016) [3] has shown that the methanol extracts of flower of *L. candidum* contain some active ingredients with the hepatoprotective potential.

According to (Tang, 2010) [26] the antibacterial activity of the bulbs of *L. davidii*, *L. leucanthemum*, *L. regale*, *L. brownii* and *L. lancifolium* were related with effective substances such as alkaloids, flavonoids and saponins. There existed a significant dose effect relation between the antibacterial activity and the contents of lily bulb extracts. The result of (Tang, 2010) [20] have also shown that the antibacterial activity increased proportionally along with the increasing contents of lily bulb extracts.

Conclusion
*Lilium* is a herbaceous perennial, bulbous herbal drug with beautifully scented flowers used traditional as well as modern system of medicine to treat various physiological disorders. The plant contains a group of bioactive substances such as saponins, flavonoids, alkaloids, aminoacids and polysaccharides. That exhibits anti-inflammatory, sedative, anticaner, analgesic and antitumor effects. The therapeutic effects of different types of compounds with diverse chemical structure isolated from *Lilium* are yet to be explored and the mechanism is validated further. There is need to study the relationship between chemical composition of various bioactive substances of *Lilium* and its pharmacological effects in health care products and related drugs should be explored in depth research, so as to it will soon take its place among the health research oriented programs.
References