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Multipurpose Ornamental *Plant Plumeria* rubra Linn (Apocynaceae)

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ABSTRACT

Plumeria rubra are commonly grown as ornamental plants in parks and home gardens because of their beautiful fragrant flowers of various color and size. *Plumeria rubra* is one of the plants which have been used in traditional medicine for many years. The plant is known to possess biological activities viz., antipyretic, antifungal, antiviral, analgesic, anticancer, antioxidative and hypolipidemic, proteolytic, cytotoxic activities etc. The present review gives an account of updated information of the botanical, phytochemical and pharmacology aspects of *Plumeria rubra.*

Keywords : Ornamental, Ayurveda, Multipurpose

I. INTRODUCTION

Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicine. Higher plants, as sources of medicinal compounds, have continued to play a dominant role in the maintenance of human health since ancient times [7]. To avoid the inevitable advanced effects of drugs prepared from chemical sources, indigenous plants are given preferences, which are also cheap, easily available and harmless [15].

Ayurveda, the ancient Indian therapeutic measure is renowned as one of the major systems of alternative and complementary medicine. As other herbal systems, greater parts of its medicaments are based on indigenous herbals. In the recent years, the interest in medicinal plants has increased in a great deal. Apart from this, people from the west have also taken this matter seriously by conducting various researches on plant based medicines [4].

Genus Plumeria belongs to the Apocynaceae family and is native to the new world. The plants from this genus are widely cultivated in the tropical and subtropical regions throughout the world. Plumeria spp. are commonly grown as ornamental plants in premises, parks, gardens and graveyards because of their beautiful fragrant flowers of various color and size. Ornamental plants are grown for decorative purposes in gardens and landscape design projects, as house plants, for cut flowers and specimen display. Ornamentals and flowers crops are not only grown for the display of aesthetic features, but also have nutritive and medicinal properties. There has been renewed interest in utilizing garden environments having medicinal value, as therapeutic entities to enhance the process of healing that occurs in healthcare environments [13]. The essential oil and fragrant constituents from the flowers of various Plumeria species are used in perfumery, cosmetics and aromatherapy.

Plumeria rubra Linn. (Apocynaceae) is a laticiferous tree which grows as a spreading shrub to a height of 7 - 8 m (20 - 25 ft). The species, commonly known as red jasmine, is native to Mexico and grows throughout India [11]. The decoction of *P. rubra* has traditionally been used to treat asthma, constipation, promote menstruation and reduce fever. The fruit was reported to be been used as an abortifacient. The flowers are aromatic and are used for the control of diabetes

mellitus while the leaves are used to ameliorate ulcers, leprosy, inflammation and rubifacient. The milky sap of the stem and leaf has been applied to skin diseases such as herpes and scabies [17]. The root bark is bitter, pungent, heating, carminative, laxative and traditionally used to treat asthma, leprosy, constipation, and ulcers [8].

II. METHODS AND MATERIAL

1) Classification

Kingdom : Plantae
Subkingdom : Tracheobionta
Superdivision : Spermatophyta
Division : Magnoliophyta
Class : Magnoliopsida
Subclass : Asteridae
Order : Gentianales
Family : Apocynacea

2) Vernacular Name

Hindi : Champa
English : True Frangipani

3) Botanical Description

Plumeria rubra grows as a spreading shrub or small tree to a height of 2–8 m (20–25 ft) and similar width. It has a thick succulent trunk and sausage-like blunt branches covered with a thin grey bark. The branches are somewhat brittle and when broken, ooze a white latex, or sap, which can be irritating to the skin and mucous membranes. The large green leaves can reach 30 to 50 cm (12–20 in) long and are arranged alternately and clustered at the end of the branches. They are deciduous, falling in the cooler months of the year. The flowers are terminal, appearing at the ends of branches over the summer. Often profuse and very prominent, they are strongly fragrant, and have five petals. The colors range from the common pink to white with shades of yellow in the centre of the flower [Edward, 1994; 8,9]. Initially tubular before opening out, the flowers are 5- 7.5 cm (2–3 in) in diameter, and only rarely go on to produce seed - 20-60 winged seeds [3].

Figure 1 : Whole plant of *Plumeria rubra*

4) Phytochemistry

Essential oil of the flowers has yielded 2-methylbutan-1-ol, β-phenylethyl alcohol, nanodecane, heneicosane, benzyl salicylate, tetradeconoic acid, octadecanoic acid and phenylacetaldehyde [18]. Crude protein, oil, hydrocarbon, polyphenol, saponification value, ash and lignin content of the species were measured to test its efficacy as an alternative energy source (Augustus et al., 2003). Iridoids such as fulvoplumierin, allamcin, allamandin, plumericin, 15-demethylplumieride, plumieride, alpha-allamcidin, beta-allamcidin and 13-O-trans-pcoumaroylplumieride; 2, 5-dimethoxy-p-benzoquinone and lignan liriodendrin were isolated from the bark of Indonesian *P. rubra* [1]

III. RESULTS AND DISCUSSION

PHARMACOLOGICAL ACTIVITY

Antipyretic Activity

Antipyretic effect of ethanolic extract of the leaf of *P. rubra* was investigated in an animal study. Pyrexia was induced by intraperitoneal administration of boiled milk at a dose 0.5 ml/kg body weight in albino rabbit. Subsiquentintraperitoneal administration of ethanolic extract of the leaf of *P. rubra* at a dose 200mg/kg body weight significantly reduced the elevated body temperature of rabbit. The results were comparable to the standard anti-pyretic drug Aspirin [16].

Anti-inflamatory Activity

The saponin extract was used for testing antiinflammatory and anthelmintic activity of *P. rubra* leaves. The anti-inflammatory activity was evaluated by determining the reduction in carrageenan induced hind paw edema in albino mice. The result of the maximum dose of 200mg/kg *P. rubra* extract exhibited a significant reduction in the volume of inflammation (Kumar, 2009).

Anthelmintic Activity

The anthelmintic effect of *P. rubra* extract of 25mg/ml concentration is comparable with that of the effect produced by reference standards piperazine citrate on Indian adult earthworms (*Pheretima posthuma*) [14].

Antioxidant Activity

Alloxan induced diabetic model in rats was used for evaluation of antioxidant and hypolipidemic activity of the flavone glycoside isolated from *P. rubra* L. The treatment showed a significant reduction in serum triglycerideslevel, while serum cholesterol and glucose were unaltered. Antioxidant activity of the drug was also confirmed through in vitro studies [9].

Anti-Cancer Activity

It is used as an anticancerous plant in Cameroon (Kuete and Efferth, 2011). Anti-cancer activity of ethanolic extract of Leaves of *Plumeria rubra* against Ehrlich Ascites Carcinoma (EAC) in Swiss albino mice. The extract at the dose of 200 mg/kg body and 400 mg/kg body weight were administered orally which increases the life span of EAC treated mice and restore the hematological parameters as compared with the EAC bearing mice [2].

Analgesic Activity

Analgesic activity of *Plumeria rubra* was tested by acetic acid induced writhing model in mice. The extract produced significant writhing inhibition at the dose of 500 mg/kg-body weight. Ethanolic extracts may possess centrally- and peripherally-mediated analgesic properties. The peripheral analgesic effect of the plant's extract may be mediated via inhibition of cyclooxygenases and/or lipoxygenases (and other inflammatory mediators), while the central analgesic action of the extract may be mediated through inhibition of central pain receptors. The crude extract of experimental plant showed analgesic activity [14].

Antimicrobial Activity

Methanolic extract of *Plumeria rubra* (leaf &flower) were able to shows antimicrobial action against different bacteria, Result shows extract Methanolic extract of leaf and flower of *Plumeria rubra* inhibits the growth of the 14 indicator bacteria with the zone inhlbiton between 12-28 mm. The extract *P. rubra* flowers found more active than the leaf part against *Bacillus cereus* with zone of inhibition of 28 [6] .

Antiviral Activity

Antiviral activity *Plumeria rubra* containing fulvoplumierin act as inhibitors of human immunodeficiency virus type 1 (HIV) revarse trancriptase [19].

IV. CONCLUSION

The various species of Plumeria are known to have medicinal properties and have a long history of use by indigenous and tribal people in India. The present review represents pharmacological uses of the plant species. Further work is still needed to elucidate its phytochemical profiling. Further research is suggested to describe its bioactivity and traditional use after elucidating the characteristics of bioactive components present in the active extracts.

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