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AN EYE-CATCHING AND COMPREHENSIVE REVIEW ON *PLUMERIA PUDICA* JACQ. (BRIDAL BOUQUET)

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Abstract

Traditional system of medicine has many plants with medicinal and pharmacological importance. The main source of food and medicine are Plants and their products which are highly beneficial for various animals and humans. This article mainly focuses on complete profile of *Plumeria pudica*, which is similarly identified as bridal bouquet and White Frangipani associates to the Apocynaceae family. In several places this is extensively available in India and A native to Columbia, Panama and Venezuela. This article provides a comprehensive review of the complete profile of an important plant *Plumeria pudica.* Traditional use of *Plumeria pudica* in various diseases includes Anti-inflammatory, nociceptive, anti-helminthic, anti-diarrheal activities and neurodegenerative disorders. The isolated components are Alkaloids, Terpenoids, Vitamins, Carbohydrates, Flavonoids, glycosides, saponins, fixed oils and some other miscellaneous compounds. The plant also possess various pharmacological activities such as Antidiarrheal, Anti-inflammatory, nociceptive, anthelmintic, gynaecological disorders, ulcerative colitis and neurodegenerative disorders like Alzheimer disease and anti-leishmanial activity. Hence this review can be a good reference for researchers who are willing to undertake further investigation about *Plumeria pudica*

***Keywords*:** *Plumeria pudica*, Latex, Ethnobotony, Pharmacological activities, Phytoconstituents, Traditional use.

Introduction

Indian traditional system of medicine for instance Rigveda, Yajurveda, Atharvaveda, Charak Samhita and Sushrut Samhita defines the plants use for the treatment of different health issues (Balunas *et al.,* 2005). *Plumeria pudica* (Apocynaceae) was typically termed as bridal bouquet that is an ornamental flowering plant associated with the typical frangipani, *P. pudica*. belongs to the native of Columbia, Venezuela and Panama. P. pudica has striking white flowers along with a long blooming period that have ended it as a prevalent landscape plant in south Florida as well as the Caribbean. (Suarez SN *et al.,* 2017). This plant was known to produce the latex. When the plant was injured, milk weed fluid usually liberated through the aerial fragments. Laticifersis were the specialized cells from the latex and contains enzymatic, carbohydrates, non-enzymatic proteins, amino acids, lipids as well as secondary metabolites .This plant has Anti-inflammatory and anti-diarrheal activities such as biological effects due to presence of various phytoconstituents. *P.pudica* latex has Anti-inflammatory and anti-nociceptive effects. In north eastern Brazil the plant has utilized as a folk medicine due to analgesic properties of it. From the review of literature, it revealed that, proteins present in *Plumeria pudica* has inhibited the inflammation in Carrageenan-induced paw oedema (Kumawat *et al.,* 2019). Apart from the above pharmacological activities *P. Pudica* was also effective in various *in vivo* and *in vitro* pharmacological activities algicidal, antibacterial and cytotoxic activities (Chowdary *et al.,* 2014) due to presence of various active constituents present in latex. In Ayurveda, the plumeria oil is called as warming oil and it is useful in treating anxiety, fear, tremors and insomnia.

Common names/vernacular names

Wild Plumeria, Bridal bouquet, White frangipani, Fiddle leaf plumeria, Plumeria caracasana, Plumeriacochleata (Radhika *et al.,* 2019).

Taxonomical classification of *plumeria pudica*

The details of Taxonomical position/ classification of *plumeria pudica* (Manjusha Chowdary *et al.,* 2014) has been tabulated in Table.1

Botanical description

Plumeria pudica, that are referred to as White Frangipani, Wild Plumeria and Lei flowers, is a shrub that normally has just one or perhaps 2 slender trunks which branch near the soil developing a thick somewhat dispersing crown. Foliage is deep green as well as distinctive fiddle shaped, or perhaps spoon-shaped (Duff *et al.,* 2014). Huge clusters of bright white flowers with minor yellow centers cover handle the tree as a lovely bouquet, thus the popular name. The flowers aren't aromatic. The image of the *Plumeria pudica* plant has shown in figure.1

Fig. 1: Whole Plant of *Plumeria pudica*

Geographical distribution

Plumeria pudica (Apocynaceae), generally referred to as bridal bouquet is a flowering ornamental plant associated with the typical frangipani, *Plumeria pudica,* A local to Columbia, Venezuela and Panama, P. *Pudica* (Gupta *et al.,* 2016) has striking flowers that are white along with an extended blooming time period which happen to have made it a favorite along with scape grow in south Florida as well as the Caribbean.

Morphology

Morphological characters such as colour, shape, size, odour, taste, fractures and surface character (Shriwas *et al.,* 2019) were described in Table 2.

Physico-chemical studies

The physico-chemical parameters such as Foreign Organic Matter (FOM), loss on Drying (LOD), Total ash(TA), Swelling Index(SI), Foaming Index (FI), Moisture extent, Water soluble extractive rate as well as Water soluble ash (Shriwas *et al.,* 2019) were described in Table 3.

Preliminary phytochemical screening of extract

Plumeria pudica Plant has the various chemical constituents and is important for the physiological and therapeutic efficacy. The hydro alcoholic extract of *Plumeria pudica* (Shriwas *et al.,* 2019) was subjected for phytochemical screening and the results of presence/absence of constituents were described in Table 4.

Quantitative Microscopy

The Quantitative Microscopical parameters of *Plumeria pudica* such as Calcium Oxalate crystals, Stomatal number, Stomatal index, Vein termination number Vein islet number, as well as Palisade ratio (Radhika *et al.,* 2019) has tabulated in **Table 5.**

Propagation Methods and Seed Collection

Propagation has done through Softwood cuttings, woody stem cuttings, Semi hardwood cuttings, Hardwood cuttings, through grafting and by air layering. Several methods are used for the seed collection which includes bag seedheads are used for the capturing of ripened seeds, allowing seedheads drying on plants, sowing as soon as possible and finally removing and collection of seeds.

Phytochemical constituents

27.0% to 34.0% of Benzyl salicylate, 8.0% to 22.0% of benzyl benzoate, 17.0% of traces of geraniol, 0.2% to 9.0% Geranyl linalool, 1.0% to 8.0% of tricosane, 8.0% of linalool, 4.0% to 7.0% nonadecane, 6.0% to 7.0% of nerolidol, and 0.3% to 4.0% of pentacosanehas identified in the vast phyto-constituents in Flower oil (Devprakash *et al.,* 2012).

Ethanobotanical information

It is mainly utilized as purgative, medicine for diarrhoea, itch cure, cough asthma, bronchitis, piles, fever, blood disorder dysentery, and tumours, Antibacterial, Anti-diarrheal, Anti-inflammatory, nociceptive, Alzheimer's disease and inflammatory bowel diseases and Anti-helminthic properties. etc (Kumawat *et al.,* 2019).

Pharmacological activities

Antidiarrheal effect

Plumeria pudica plant is having wide use for controlling chronic diarrhoea and dysentery due to protein fraction water soluble *Plumeria pudica* (LPPp), which is tested in various models such as diarrhoea persuaded through castor oil, cholera toxin or prostaglandin E2 (PGE2). Water soluble protein element. *Plumeria pudica* was tested with different doses has significantly inhibited the diarrhoeal stools, intestinal motility, and intestinal fluid accumulation along with intestinal transit. LPPp has prevented the alterations in glutathione and malondialdehyde. Presence of proteinases, proteinase inhibitors in *Plumeria pudica* latex, has inhibited the seriousness of diarrhoea of rodents caused by castor oil as well as cholera toxin also it's related with LPPp anti-inflammatory qualities. The antidiarrheal consequence of *Plumeria pudica latex* (LPPp) was because of protection of intestinal inflammatory details of oxidative stress (Santana *et al.,* 2018).

Anthelmintic activity

Plumeria pudica leaves have the excellent anti-helminthic activity against Indian earthworm Pheretimaposthuma by using various extracts. From the results, it is observed that *Plumeria pudica* shown potent anti-helmintic activity while the P. posthuma has taken a long time for death (190 min–110 min) of worms. The angleworm chosen for the anthelmintic activity was maximum delicate towards the different solvent excerpts, namely petroleum ether, ethyl acetate, chloroform and methanol. The anthelmintic activity result revealed dose-dependent paralysis range starts with motility loss and then leads to response loss towards outer stimuli, that finally progressed to destruction at 10 mg/ml as well as 20 mg/ml concentrations, paralysis, was observed, respectively, at 110 min and 90 min and death at 130 min and 120 min in methanol extracts. It was concluded that petroleum ether, ethyl acetate, chloroform and methanol excerpts of *Plumeria pudica* leaves exhibited the dose-dependent anti-helminthic activity (Radhika *et al,.* 2019)

Gynaecological disorders

Every women suffers with a gynaecological disorders such as vaginal infection, menstrual problems etc. The infection was more in rural areas because of non-hygienic conditions, life style and their food habits. In India so many medicinal plants are used in ayurveda which do not have any toxicity or less toxic compared to synthetic drugs. In order to use in a better way the drugs are to be standardized and validated with established methods. In the present study plumeria pudica and other three herbs play an important role to cure the gynaecological disorders in medication conventional system (Shriwas S *et al.* 2019).

Anti-inflammatory and nociceptive activities

Plumeria pudica plant has the Anti-inflammatory and nociceptive properties. The *plumeria pudica jacq* latex was assessed for anti-inflammatory activity against paw edema evoked through Carrageenan and edema evoked through dextran, histamine, serotonin, bradykinin, prostaglandin E2. Intraperitoneal authority of various prescriptions related to plumeria pudica jacq latex has significantly reduced the paw volume in paw edema evoked through Carrageenan which is due to reduction in myeloperoxidase activity. The latex has also compact the leukocyte peritoneal migration evoked

through Carrageenan as well as decrease of IL-1 and TNF-α in peritoneal fluid. It also compact the animal abdominal contraction evoked through acetic acid along with paw licking model evoked through formalin. The results are the clear evidence that latex fluids present in *Plumeria pudica* consists of rich amino acids having strong medicinal advantages (Fernandesa *et al.,* 2015)

Ulcerative colitis

Apart from the anti-inflammatory properties, *Plumeria pudica* has protective properties in animals against inflammatory ulcerative colitis which relates to instigative intestinal sickness. In this study ulcerative colitis was induced by 6 % acetic acid solution which is given through intracolonic instillation in mice. Simultaneously Latex proteins from *P. pudica* (LPPp) were administered. After eight hours of acetic acid administration mice were subjected to euthanasia and the colons were excised for the determination of the wet weight, macroscopic as well as microscopic lesion scores, myeloperoxidase (MPO) activity, IL1-β levels, glutathione (GSH) and malondialdehyde (MDA) concentration and superoxide dismutase (SOD) activity. The outcomes stated that Latex proteins from P. pudica (40 mg/kg) have antifouling result against acetic acid evoked ulcerative colitis. The medication with LPPp has also lowered the levels of cytokine IL-1β, adding to the decrease of colon inflammation. The above evidences and information propose that LPPp has an antifouling effect contrary to enteral harm directed by processes which include the organic process of inflammatory cell incursion, cytokine freeing and oxidative stress (Oliveiraa *et al.,* 2019).

Alzheimer's disease

Alzheimer disease which falls under category of neurodegenerative condition caused due to increased levels of acetylcholine esterase. The AChE enzyme works towards the degradation of the neurotransmitter acetylcholine (Ach) in to acetic acid and choline and affects the nerve transmission. It's treatment includes the suppression of the act of AChE, that causes alteration in the neurotransmission .Plants contains AChE by nature. Methanolic extract of the leaves of *Plumeria pudica* was tested for AChE inhibitors for the brain homogenate of the zebrafish (*Daniorerio*). Through titri-metric investigation of the AChE in in-vitro as well as in-vivo conditions the act was listed. The results stated that the methanolic excerpt of *Plumeria pudica cuts down* the act of AChE (Chanaka e*t al.,* 2016).

***In vitro* anti-leishmanial activity**

Plumeria pudica plant leaves have the antileishmanial activity. *P. pudica* leaf was assessed contrary to *Leishmanial donovani* (strain AG 83) promastigotes by *in vitro* promastigotes cell toxicity assay through taking MTT (3-(4,5-dimethylthiazol-2-yl)-2,5 diphenyltetrazoliumbromide). The *in vitro* antileishmanial activity of petroleum ether, chloroform as well as methanol extracts from *P. pudica* leaf was assessed contrary to *Leishmanil donovani* (strain AG 83). All the excerpts were considerably constrained the growth of L. Donovani promastigotes *in vitro* in a dose reliant way. *Plumeria pudica* plant leaves exhibited considerable *in vitro* antileishmanial activity contrary to Leishmanial donovani promastigotes (Sarkar *et al.,* 2013).

Conclusion

Several parts of *Plumeria Pudica* have been reported as various traditional healers for treating various ailments of mankind. These contains Antibacterial, Anti-diarrheal, Anti-inflammatory, nociceptive, Alzheimer's disease and inflammatory bowel diseases and Anti-helminthic properties. This review mainly focused on phytochemical and pharmacological studies which are explained phytoconstituents and therapeutic potential of *Plumeria Pudica.*

Table 1: Taxonomical classification of *Plumeria pudica*

Kingdom	**Plantae**
Sub kingdom	Tracheophytes
Class	Dicotyledons
Subclass	Asterids
Order	Gentianales
Family	Apocynaceae
Genus	*Plumeria*
Species	*Pudica*

Table 2: Morphological characters of *Plumeria pudica*

S.No	**Morphological character**	***Plumeria Pudica***
1	Color	Parrot green
2	Shape	Oblong
3	Size	5-12 cm
4	Odour	Characteristic odour
5	Taste	Acrid
6	Fracture	Absent
7	Surface Character	Smooth

Table 3: Physico chemical studies of *Plumeria pudica*

S.No	**Parameter**	**Values Obtained (% w/w)**
1	LOD	2.4182
2	FOM	0.8817
3	TA	5.1738
4	SI	0.8771
5	FI	1.0164
6	Moisture content	60.9
7	Water soluble extractive value	12.5
8	Water soluble ash	2.5

Table 4: Preliminary phytochemical screening of Hydro alcoholic extract of *Plumeria pudica*

S.No	**Test**	**HAEPP**
1	Alkaloids	+
2	Carbohydrates	+
3	Glycosides	+
4	Fixed oils	+
5	Saponins	+
6	Flavonoids	+
7	Tannins	-
8	Steriods	-
9	Gums and Mucilage	-
10	Triterpinoids	-

Table 5: Quantitative Microscopy of *Plumeria pudica*

Parameter	**Value**
Calcium Oxalate crystals	26.64-66.6µ
Stomatal index	20
Stomatal number	250/mm^2
Vein islet number	13 mm^2
Vein termination number	18 mm^2
Palisade ratio	6.25 mm^2

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