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## A phytopharmacological review on *Justicia picta* (Acanthaceae): A well known tropical folklore medicinal plant

Pradeep Singh<sup>1\*</sup>, Ratan Lal Khosa<sup>2</sup>, Garima Mishra<sup>1</sup>, Mohd Adil Tahseen<sup>1</sup><sup>1</sup>Department of Pharmacognosy, Teerthanker Mahaveer College of Pharmacy, Teerthanker Mahaveer University, Moradabad, UP, India<sup>2</sup>Department of Pharmaceutical Science, Bharat Institute of Technology, Meerut, India

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### ABSTRACT

The Acanthaceae family is an important source of therapeutic drugs and the ethno pharmacological knowledge of this family requires urgent documentation as several of its species are near extinction. *Justicia* is the largest genus of Acanthaceae with approximately 600 species. Aim of the present review is to present literature for the traditional uses & pharmacological review of *Justicia picta* (Family: Acanthaceae) and to discuss further priorities of research yet to be discovered.

#### Keywords:

*Justicia picta*

Phytochemistry

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## 1. Introduction

Medicinal plants have a promising future because there are about half million plants around the world and most of them have not investigated yet for their medicinal activities. These medicinal activities could be decisive in the treatment of present or future studies[1]. World Health Organization estimated that 80% population of developing countries relied on traditional medicines, mostly plant drugs for primary health care needs. Even modern pharmacopoeia still contains 25% drugs derived from plants and many others which are semisynthetic molecules derived from prototype compounds isolated from plants[2].

Medicinal plants are major components of all indigenous or alternative system of medicines. Over the years, scientific research has expanded our knowledge of chemical effect and composition of active constituents which determine the medicinal properties of plants. It has been universally accepted that plant drugs are safer than that of synthetic medicines for curing the complex diseases like cancer and AIDS. Enormous number of alkaloids, glycosides and antibiotics have been isolated, identified and used as curative agents[3].

*Justicia picta* (Syn: *Graptophyllum pictum*), named as 'daun ungu (violet leave)' in Indonesia is one of the traditional herbal plants commonly grown as shrub. There are two varieties, variegated colored known as 'white adulsa'; the other dark-leaved variety known as 'black adulsa'. *Justicia picta* has pharmacological specialty for various health problems such as to relieve anuria, constipation, hemorrhoids, maturing boil process, weak laxative, skin softener and to enhance menstrual blood flow. *Justicia picta* is found to have some phytoconstituents such as alkaloids, pectin and formic acid. Therefore, we aimed to compile an update and comprehensive knowledge on *Justicia picta*[4].

\*Corresponding author: Pradeep Singh, Assistant Professor, M. Pharm, PhD (Pursuing), Teerthanker Mahaveer College of Pharmacy, Teerthanker Mahaveer University, Moradabad, UP, India.

Tel: 9411072468

E-mail: pradeep\_2682@yahoo.co.in

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### 1.1. Description

Caricature plant is a tropical evergreen shrub. Oval to elliptic leaves (up to 6 inches long) are deep green varyingly blotched with cream along the mid veins. Terminal clusters (3–4 inches long) of flowers are red to purple-red with protruding stamens[5].

### 1.2. Distribution

*Justicia picta*, a well-known garden shrub is believed to be native of New Guinea and neighboring islands. It is widely distributed throughout the tropics, where it has been grown as an ornamental plant in gardens for decades.

The plant is distributed in India, Papua, Nicaragua, Panama, Costa Rica, Mexico, United States, Ghana, and Bolivia[6-8].

### 1.3. Taxonomical classification

The taxonomical classification of *Justicia picta* are as follows: kingdom: Plantae; subkingdom: Tracheophyta; division: Spermatophyta; class: Magnoliophyta; sub class: Magnoliopsida; order: Lamiales; family: Acanthaceae; genus: *Graptophyllum* and species: *pictum*[9].

### 1.4. Synonyms

The synonyms of *Justicia picta* are *Graptophyllum hortense*, *Graptophyllum picturatum* and *Marama picta*[10,11].

### 1.5. Common names

The vernacular names of *Justicia picta* are as follows: English: caricature plant, Joseph's coat, Café conleche; Konkani: Kala adulsa, Pandhara adulsa; Chinese: Man hua hua and Malay: Daun ungu[12,13].

### 1.6. Parts used and traditional uses

Leaves and whole plant are used. Traditionally, plant is used in the treatment of reducing fertility[14], constipation, rheumatism, hemorrhoid, urinary infections, scabies, maturing boil process, smoothing skin, hepatomegaly and ear diseases. It also has anti-fungal, anti-inflammatory, anti-plaque, laxative, anti-viral and anti-bacterial activities[15,16].

### 1.7. Phytoconstituents

*Justicia picta* is found to contain alkaloid, glycoside, pectin, formic acid, steroid, saponin, tannin, flavonoid and alcohol[16,17].

## 2. Pharmacological review

### 2.1. Oxytocic and anti-implantation activities

The *in vitro* oxytocic and *in vivo* anti-implantation activities of aqueous and ethanolic extract of leaves of *Justicia picta* were determined. The oxytocic effect was assessed on the isolated strip

of gravid rat uterus in mild pregnancy and was compared with the activity of standard drug oxytocin. The aqueous extract was found to be potent and suppressed the normal contraction of uterine strip while the ethanolic extract exhibited agonistic effect which was rapid in onset. The anti-implantation evaluation was carried out by using three groups of eight-week-old virgin female Sprague-Dawley albino rats. Various parameters such as presence of foetus, implantation sites and number of corpora lutea in the autopsied rats were recorded and used to calculate the % anti-implantation effect. The results revealed that alcoholic extract exhibited high percentage of anti-implantation (93.85%) while aqueous extract exhibited very little (16.80%) when compared with the control (3.90%)[14].

### 2.2. Alkaline phosphatase activity against MC3T3E1 cells as a marker of osteoblast differentiation cells

The stimulative activity was investigated in hexane, ethyl acetate, *n*-butanol and water fractions of leaves of *Justicia picta* on alkaline phosphatase (ALP) of osteoblast cells. The ethanolic extract at concentration 50 µg/mL showed 128% ALP stimulative activity whereas *n*-butanol and water fractions showed 112% and 122% against MC3T3E1 osteoblast cell at 10 and 50 µg/mL respectively. The *n*-butanol and water fractions were found to be active fraction because they stimulated ALP activity[15].

### 2.3. Effect on acrylic resin complete denture plaque growth

The effect of *Justicia picta* towards the growth of denture plaque on acrylic resin complete denture was assessed at various concentrations of ethanolic extract such as 5%, 10%, 20% and 40% to carry out this experiment. The result of the experiment revealed the highest plaque growth inhibition in those soaked in 40% extract solution and the lowest inhibition were found in those soaked in 5% concentration solution[17].

### 2.4. Anti-inflammatory activity

The anti-inflammatory and analgesic effects of ethanolic extract of leaves of *Justicia picta* were evaluated on carrageenan induced edema in rats & acetic acid induced vascular permeability as writhing symptom in mice. The extract was partitioned between ether and water, and then water-soluble fraction was extracted with 1-butanol. The 1-butanol-soluble fraction was further extracted with chloroform-acetone, hot methanol and water successively. The water soluble fraction, 1-butanol fraction and hot methanol fraction were also investigated for the same activities. The anti-inflammatory activity was partly due to flavonoids present in the hot methanol fraction[18].

### 2.5. Nephroprotective activity

The nephrotoxicity activity of ethanolic extract of whole plant of *Justicia picta* in albino male Wistar rats was evaluated by estimating the serum creatinine and urea level as well as renal antioxidant parameters. Nephrotoxicity was induced by intraperitoneal administration of cisplatin at dose level of 12 mg/kg body weight. Ethanolic extract at dose level of 150 and 300 mg/kg was administered orally after cisplatin injection for 15 days.

The experimental result showed that the ethanolic extract exhibited significant reduction in evaluated serum creatinine and urea levels and renal antioxidant defence systems such as superoxide dismutase, catalase, glutathione peroxidase and reduced glutathione were restored to normal by treatment of extract[19].

### 2.6. Blood glucose lowering effect of aqueous extract & its acute toxicity in mice

The antidiabetic activity of aqueous extract of *Justicia picta* leaf was reported on alloxan induced diabetic Wistar rat. After diabetic induction, the rats were divided into 5 groups. Groups 1 to 3 were orally administered 100, 150 and 200 mg/kg body weight extract by gastric probe for four weeks; Group 4 was administered metformin (10 mg/kg body weight) as standard drug, while Group 5 served as control and received the vehicle (distilled water). A fasting blood glucose level of the rats was checked before commencement of treatment and weekly during the drug administration period using Roche Accu-Chek active glucometer. The results obtained from the anti-diabetic study revealed a significant reduction ( $P < 0.05$ ) in the mean fasting blood glucose level, in all the three groups of animals treated with plant extract when compared to the control and it exhibited effective anti-diabetic potency when compared with metformin[20].

### 3. Conclusions

Medicinal plants have played a pivotal role in the development of human culture. Ever since ancient times, in search of rescue for their diseases, the people looked for drugs in nature. In a time, the reasons for the uses of specific herbal plant for treatment of certain ailments were discovered; thus the medicinal plants use gradually abandoned the imperial framework and became founded on explicatory facts.

This review is a meticulous compile of the research data on *Justicia picta* and its various therapeutic potentials. Analysis of literature on *Justicia picta* reveals major lacunae and subsequently opens new avenues for research.

### Conflict of interest statement

We declare that we have no conflict of interest.

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