

## A Review on *Argemone Mexicana*

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### Abstract

*Argemone mexicana* Linn belonging to family papaveraceae is widely distributed plant in tropical and sub tropical regions of the world. In India, It is found on road sides, across fields and water bodies. It consists of root, flowers & leaves. It is also called as Mexican Poppy. The present article reviews the morphological, microscopical characters, phytochemical and pharmacological studies on the plant and determines a scientific base for novel study for future research to establish toxin free response of plant or its phytoconstituents.

**Keywords:** *Argemone Mexicana*, morphological, microscopical, phytochemical constituents.

### 1. Introduction

WHO had given the information that traditional medicines are safe for the treatment of infections originated from microbial and non microbial origin. According to WHO the best source of medicines are medicinal plants, therefore such plants should be studied and evaluated properly to check their structural and functional properties as well as the medicinal activities of each. It is available in Caribbean, North America & India.

Its vernacular names are as follows:

Bengali	: Barashit-kantal.
Kannada	: Datturigidida.
Konkani	: Phirangi-dhutro.
Malayalam	: Ponnunmattu.
Marathi	: Phirangi-dhotra.
Sanskrit	: Kankkshiri.
Tamil	: Kudiyotti
Telugu	: Brahmadandi.
Hindi	: Satyanashi.

#### 1.1 Morphology

It is a prickly, glabrous, branching herb with yellow juice and showy yellow flowers. The height of this plant varies between 0.3 to 0.12 meters, leaves are thistle like measurement. Stem clasping, oblong, sinuately pinnatifid and spinous. Veins are white. Flowers are

terminal, yellow and are of 2.5–5.0 cm in diameter. Fruits are capsules, prickly and oblong ovoid. Seeds are numerous, globosely, netted and brownish black. Pollen is tri-tetraporate. [1]

#### 1.2. Microscopy

Microscopically, following characters were observed: presence of anomocytic stomata which are few in number, starch grains, fibres and xylem vessel thickening are of different types. These are annular, spiral, reticulate and scalariform. With respect to chemo microscopical studies, cellulose, starch grains, lignins, tannins, prisms calcium oxalate crystals were observed. Quantitative determinations of the stems showed the average moisture contents- 9.7 % w/w, ash-value-8.5% w/w, acid-insoluble ash-4.5% w/w, alcohol-soluble extractive-8.0% w/w and water-soluble extractive value-15.0 % w/w. [2]

#### 2. Phytochemical Screening [3]

The flowers were dried and powdered. Then it was subjected to cold percolation process for 48 hours. Methanol and distilled water were used in this process. After the completion of this process, the extracts obtained were filtered and used for preliminary phytochemical screening such as alkaloids (Iodine, Wagner, and Dragendroff's test), flavonoids (Pew's, Shinoda and NaOH tests), glycosides (Keller-Killani test, Molisch test and

Conc. H<sub>2</sub>SO<sub>4</sub>), lignin (Lignin tests), phenols (Phenol tests and Ellagic acid test), saponins (Haemolysis test and Foam test), sterols (Liebermann burchard test and Salkowski tests) and tannins (Gelatin test and Lead acetate tests) were carried out.

Alkaloids have different pharmacological activities such as antimicrobial, analgesic, muscle relaxants, stimulants, anti-microbial, anesthetics, anti-diabetic, anti-HIV, anti-cancerous, antioxidants etc., Flavonoids have inherent ability to modify the body's reaction to allergen, virus and carcinogens. They show antimicrobial, anticancer and anti-allergic activities by which it can be used for different diseases that are generally found in bark. Tannins have general antioxidant activities, cytotoxic, antimicrobial and anti neoplastic activities. Saponins have antifungal properties. They are used in hypercholesterolemia, antioxidant, anticancer, anti-inflammatory and weight loss etc., according to medical field. It is a bioactive antibacterial agent of plants. Plant steroids have cardio tonic activity, insecticidal and antimicrobial properties. Phenolic compounds have anti-oxidative, anti diabetic, anti carcinogenic, anti mutagenic and anti-inflammatory properties.

### 3. Traditional Uses

#### 3.1 Fever

Roots of *Argemone mexicana* are ground with *Piper nigrum*. One spoonful of the obtained extract is given twice a day for 5 days.[4]

#### 3.2 Malaria

Roots of *Argemone mexicana* are ground along with seeds and leaves. Two spoonfuls of the obtained extract is given once a day for 4 days.[4]

#### 3.3 Spermatorrhea

The root bark extract of *Argemone mexicana* is taken along with cow ghee in 2:1 proportion, one tea spoonful of the extract obtained is taken once a day morning for two weeks.[4]

#### 3.4 Jaundice

Plant juice of *Argemone mexicana* is used orally. 2-3 spoons daily for one week is used to cure jaundice. Tea from dried leaves is used to quit smoking and drug abuse.[5]

#### 3.5 Scabies

Seeds are roasted on hot iron pan to get ash. This ash is mixed with ample amount of *coconut oil* to prepare a paste. It is applied on the affected area every day, till cured.[6]

#### 3.6 Antidote

Paste of 20 g root of *Argemone mexicana* along with 20 g petiole of *Maharukh* (*Ailanthus excelsa* Roxb.) is applied on the snake bite area as an antidote.[7]

#### 3.7 Impotency

About half cup of root extract of *Argemone mexicana* along with 25 ml of buttermilk is used early in the morning for three days to increase sperm count.[7]

#### 3.8 Wounds

Yellow coloured latex extracted from fresh stem of *Argemone mexicana* is used to cure wounds. [8]

#### 3.9 Ring worm infections

About ten grams of the leaf paste of *Argemone mexicana* is externally applied once a day to treat the ringworm infection.[9]

#### 3.10 For curing injuries and to kill worms

*Argemone mexicana* (Papaveraceae)  
Sathyanashi[6]:

- (i) Oil is extracted from seeds of *Argemone mexicana*. It is applied on injuries
- (ii) Seeds of *Argemone mexicana* are burnt and the fumes are passed on gums to kill worms.

#### 3.11 Skin diseases

Along with the pouded seeds of *Argemone mexicana* the rhizomes of *Curcuma aromatic* and *Acorus calamus* made into paste and applied on all types of skin diseases.[10]

### 4. Pharmacological Actions

*Argemone mexicana* possess analgesic, narcotic, sedative and anti-spasmodic properties. The fresh yellow milky seed extract contain protein dissolving substance which is effective in the treatment of warts, skin disease, cold sore, dropsy and also in jaundice. The following section discusses its various therapeutic uses in medicine.

### 5. Medicinal Uses

#### 5.1 Anti-Malarial Activity

Aqueous extract of the aerial parts of the *Argemone mexicana* plant was found to exhibit anti-parasite activity against the chloroquine-resistant K1 strain of *Plasmodium falciparum*. [11]

#### 5.2 Cytotoxic Activity

From the methanol extract of *Argemone mexicana*, six alkaloids were screened. They are 13-oxoprotopine, protomexicine, 8-methoxy dihydrosanguinarine, dehydrocorydalmine, jatrorrhizine, and 8-oxyberberine were isolated. Cytotoxicity of these alkaloids was studied on SW480 human colon cancer cell line. At a dose of 200 µg/mL, protomexicine and 13-oxoprotopine exhibited mild cytotoxicity (~24–28%) whereas dehydrocorydalmine showed moderate cytotoxicity (~48%). 8-Oxyberberine was mildly cytotoxic (~27%) at 24 h but was more potent (~76%) at 48 h. Jatrorrhizine and 8-methoxydihydrosanguinarine were most potent (~95–

100%) in inhibiting the human colon cancer cell proliferation showing complete reduction in cell viability.[12]

### 5.3 Anti-Termite Activity

Acetone leaf extract of the *Argemone mexicana* plant exhibited significant anti-termite activity against the Formosan subterranean termite pest, *Coptotermes formosanus* Shiraki, in a dose-dependent manner. After 48 h of exposure, the plant extract exhibited LD50 and LD90 values of 253 and 1511 ppm, respectively.[13]

### 5.4 Prevention of Micronucleus Formation

Fruits of *Argemone mexicana* were collected and extract was evaluated against cyclophosphamide-induced micronucleus formation in the mouse bone marrow cells. The single i.p. administration of *Argemone mexicana* fruits extract at the dose of 50, 100 and 150 mg/kg body weight, before 24 hours of administration of cyclophosphamide (at the dose of 50 mg/kg) have prevented the formation of micronucleus in a dose dependent manner in bone marrow cells of mice as compared to cyclophosphamide group. Therefore, *Argemone mexicana* fruit extract seems to have a preventive potential against CP-induced micronucleus formation in Swiss mouse bone marrow cells.[14]

### 5.5 Neuropharmacological Activity

Reported on neuropharmacological applications of *Argemone mexicana*; According to that, in *Wistar albino* mice at an oral dosage of 100, 200 and 400 mg/kg b.w, the ethyl acetate and methanol extract of the whole plant of *Argemone mexicana* exhibited analgesic, loco motor and muscle relaxant activity. Both extracts exhibited significant activities but methanol extract at a dosage of 200 mg/kg body weight was found to be more potent for central nervous system activities such as analgesic, anxiolytic and sedative effects.[15]

### 5.6 Wound Healing Activity

Fresh leaves of *Argemone mexicana* are collected and were separately evaluated for their wound healing activity in rats using excision, incision and dead space wound models.

Excision and incision, significantly improved wound-healing activity with the chloroform, methanol and aqueous extracts of *Argemone mexicana* compared to that of the reference standard and control group of animals. In the infected wound model, the methanol extract showed significant healing effect against *Staphylococcus aureus*. [16]

### 5.7 Anti-Diabetic Activity

Aqueous extract of aerial parts of *Argemone mexicana* at a dose of 200 and 400 mg/kg body weight was found to have hypoglycemic efficacy in alloxan-induced diabetic rats. It is found that there is a significant reduction in blood glucose levels, plasma urea, creatinine,

triacylglyceride, cholesterol values and as well as recovery in the body weight of the animal compared to diabetic control rats. The standard drug treated rats are those which are treated with the aqueous extract at a dose of 400 mg/kg body weight.[17]

### 5.8 Antimicrobial Activity

Aerial and roots parts of *Argemone mexicana* were collected, washed with clean water and air-dried. The antimicrobial activity of *Argemone mexicana* at different concentrations was determined by agar well diffusion method.

A total of 7 microorganisms that consisted of four bacterial and three fungi were tested. Standard antibiotics (Ampicillin and Ketoconazole) were used as positive control while 75% methanol as negative control. The results obtained from the agar well diffusion method and the measurement of the MIC values revealed that *C. albicans* was the most sensitive with the lowest MIC values of 2.0 mg/ml in the presence of essential oil while *C. toruplosis* was least sensitive to *A. mexicana* essential oil.[18]

### 5.9 Antibacterial Activity

The fresh seeds were collected from plants and washed three times with distilled water and dried on blotting paper in laboratory at  $37 \pm 1^\circ\text{C}$  for 24 h. After drying, seeds are powdered using grinder and then extracted with methanol, ethanol and water.

The sensitivity of bacterial strains to various extracts revealed that the seeds extract in the chloroform was inhibitory to the test organisms *E. coli*, *P. aeruginosa*, *Enterococcus*, *S. typhi*, *S. aureus* and also for the resistant strains of *P.aeruginosa* and *S.aureus*. Methanol seed extracts were observed inhibitory to *P. aeruginosa*, *S. typhi*, and *S. aureus*. The chloroform extract of seeds was found more (> 10.0 mm) inhibitory in comparison to methanol extracts. However, no inhibitory activity was observed in the water and hexane extracts of seed.[19]

### 5.10 Hepatoprotective Activity

The plant extracts of *Argemone mexicana*, at a dose of 500 mg/kg b.wt. Showed very insignificant changes instead of producing toxicity compared to normal group. That is percent of increase of SGPT and SGOT for *Argemone mexicana* were 79.77% and 4.4% respectively.[20]

### 5.11 Oral care activity

An oral medicinal plants survey was conducted in districts of Tamil Nadu during the period of 2000-2004. A total of 114 plants species, distributed among 97 genera. Among them the whole plant of *Argemone mexicana* is used for common dental disorders.[21]

## 6. Adulteration

Consumption of adulterated mustard oil (*Brassica nigra*) with argemone oil (*Argemone mexicana*) even for a short duration leads to epidemic dropsy. In humans, adulteration of mustard oil with Argemone oil causes oxidative stress and death of red blood cells via methemoglobin formation by altering pyridine nucleotide(s) and glutathione redox potential. Argemone oil contamination poses a serious threat to human health.[22]

## 7. Poisoning

Suspected cases of epidemic dropsy have been investigated by Dr. R.E. Meaker in the North-western Cape districts. In all aspects the disease resembled Indian epidemic dropsy. In experiments conducted upon fowls with the seed of the Mexican poppy collected from the lands on which the wheat eaten by the victims was grown, symptoms and histological lesions similar to those seen in human epidemic were produced. With the information at our disposal we can come to no conclusion other than that the said outbreak in the Carnarvon district was epidemic dropsy caused by the consumption of wheat contaminated with the seed of the Mexican poppy.[23]

## 8. Conclusion

The extensive survey literature reviewed that *Argemone mexicana* Linn, has some important medicinal and pharmacological activity. Further evaluation need to be carried out on *Argemone mexicana* in order to explore concealed areas and their practical clinical application, which can be used for the welfare of the mankind. There is a scope to identify new compound and check claimed pharmacological activity. There is a need to identify new mean for elimination of toxic effect to get toxic free as well as significant response on claimed pharmacological activity.

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