

## A Review On Pharmacological Potential Of *Argemone mexicana* In Management Of Wound Healing & Antidiabetic Activity

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### ABSTRACT

The extracts obtained from exclusive parts of the Plant are mentioned to exhibit therapeutic properties due to presence of exceptional phytochemical compounds. The leaves, stem, seeds, flowers, fruits and roots extracts of *Argemone mexicana* have been found to incorporate Anti-inflammatory, Wound healing, Antidiabetic, Anti-HIV treatment, Antimalarial, Antifungal, Cytotoxic activity etc. *Argemone mexicana* is a stress-resistant member of the Papaveraceae has been used in standard remedy for centuries with the aid of indigenous communities in Mexico and Western components of the United States. *A. mexicana* shows analgesic, narcotic, antispasmodic and sedative activities. *A. Mexicana* is used in India as traditional medicine in Ayurveda, Unani and Siddha for jaundice, ophthalmia, scabies, cutaneous affections and dropsy and helps to maintain normal blood circulation and cholesterol level in human. These plant parts possess anti-venom property as well. Chemical investigation on *Argemone mexicana* explore the presence of different types of active compounds like Sanguinarine, Tetrahydrocoptisine, (S)-Cheilanthifoline, Chelerythrine, Dihydropalmatine Hydroxide,  $\beta$ -sitosterol, Protopine, Berberine etc. This review explores the details of traditional use, plant profile, plant description, therapeutic constituents, and therapeutic potentials of *Argemone mexicana* especially on Wound healing & Anti-diabetic property.

**KEY WORD:** *Argemone Mexicana*, Wound healing activity, Anti-diabetic activity

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### I. INTRODUCTION:

Nature helps human beings to develop a healthy life and perform a great role to preserve our health<sup>[1]</sup>. India is recognized one of the oldest and eminent nation<sup>[2]</sup>. Plants are exclusive source of medicines and able to cure various chronic diseases. These medicines are collect from plant extractive as a form of crude drugs<sup>[3]</sup>. Medicinal plants contain various important phytoconstituents that are used to manage of various human illnesses<sup>[4, 5]</sup>. Ancient India is recognized as the “Emporium of Medicinal Plants” and medicinal plants are potentially reach sources of medicinal substances<sup>[6,7]</sup>. *Argemone mexicana* (Papaveraceae), commonly known as Prickly Poppy in English and widely found in the United States and now a days widely distributed in many tropical and sub-tropical countries<sup>[8]</sup>. It occurs in almost every region of India<sup>[9]</sup>. The plant mostly grown in sandy, well-drained, nutritionally poor and alkaline soils<sup>[10]</sup>. Flowers get height up to 4 to 5 cm in diameter, yellow and scentless, seeds are spherical, shining and black pitted<sup>[11]</sup>. Leaves height up to 5 to 11 cm long, with green and white, Glacous board and spiny<sup>[12]</sup>. It has lots of phytochemicals which is used for managing of various health problems, and this plant can be also easily accessible and it is economically feasible also<sup>[13]</sup>. *A. mexicana* shows positive response against the analgesic, narcotic, antispasmodic and sedative properties<sup>[14]</sup>. *A. Mexicana* is used in India as traditional medicine in ayurveda for jaundice, ophthalmia, scabies, cutaneous affections and dropsy<sup>[15,16,17]</sup>. Leaves and seeds extract are helps to maintain normal blood circulation and cholesterol level in

human<sup>[18]</sup> . These plant parts possess anti-venom property as well <sup>[19,20]</sup>. This review deals with different phytochemical and pharmacological potential of *Argemone mexicana* in management of wound healing & antidiabetic activity.

**PLANT PROFILE:**

Table I: The systematic classification of *Argemone mexicana*.

<b>Domain</b>	Eukaryota
<b>Kingdom</b>	Plantae
<b>Phylum</b>	Spermatophyta
<b>Subphylum</b>	Angiospermae
<b>Class</b>	Dicotyledonae
<b>Order</b>	Papaverales
<b>Family</b>	Papaveraceae
<b>Genus</b>	Argemone
<b>Species</b>	Argemone mexicana



**VERNACULAR NAMES** <sup>[21]</sup>




The plant is recognized by way of exclusive vernacular names in the one-of-a-kind areas by the local humans mentioned in Table II.

Sr no	Language	Vernacular names
1.	Marathi	Phirangi Dhotra
2.	Hindi	Satyanashi
3.	Bengali	Barashil-kantal
4.	Assamese	Kuhum-kata, Sial-kanta
5.	English	Mexican Poppy, Prickly poppy, Yellow mexican poppy
6.	Kannada	Datturi Gidda
7.	Konkani	Phirangi Dhutro
8.	Malayalam	Ponnumattu
9.	Sanskrit	Kshirini, Swarnakshiri
10.	Tamil	Piramathanda
11.	Telugu	Brahmadandi
12.	Irula	Mulluumathai
13.	Other	Bhramadanthi, Mullu Umathai, Pivladhotra

**PLANT DESCRIPTION** <sup>[11, 12]</sup>

**Table III:** Description of different parts of *Argemone mexicana*.

Plant Parts	Description	Image
<b>Stem</b>	Stem is cylindrical to rectangular, swish and pale chromatic. The complete stem is roofed with terribly short hairs and few long yellow spines.	
<b>Leaves</b>	Leaves are easy, alternate, sessile, blue-green, thick and coriaceous. Blade is compound, pinnated form unsubdivided, base slightly clasping, six to twenty cm long and three to eight cm wide. Lobes rectangular, convoluted, teeth ending in spines. Pinnated veins, whitish spines on smaller and fewer frequent, particularly on the undersurface. Each leaf surfaces are hairless.	

<b>Flowers</b>	The flowers are giant, four to seven cm in diameter. There are six spherical petals, bright yellow.	
<b>Fruits</b>	Fruits looks like a ovoid capsules shape, 2cm in diameter and 5 cm in lenght. It's coated by stout, yellow spines. Once ripe it opens from the apex. It's divided into 5 chambers, contain varied seeds.	
<b>Seeds</b>	Seeds are created in profusion, tiny and black, 1.7-2 mm x 1.6 mm.	

#### SPECIES OF ARGEMONE [22], [23]

*Argemone mexicana* belongs to the genus *Argemone*, its selected species, and their common names are mentioned in given Table IV:

SPECIES	COMMON NAME
<i>Aegemoneaenea</i> G.B. Ownbey	Golden prickly poppy
<i>Argemone hispida</i> A. Gray	Rough prickly poppy
<i>Argemone albiflora</i> Hornem	Bluestem prickly poppy
<i>Argemone Mexicana</i> L.	Mexican prickly poppy
<i>Argemone munita</i> Durand & Hilg.	Flat-bud prickly poppy
<i>Argemone ochroleuca</i> Sweet	Pale Mexican prickly poppy
<i>Argemone arizonica</i> G.B. Ownbey	Arizona prickly poppy
<i>Argemone aurantiaca</i> G.B. Ownbey	Texas prickly poppy
<i>Argemone pleiacantha</i> Greene	Southwestern prickly poppy
<i>Argemone chisosensis</i> G.B. Ownbey	Chisos Mountain prickly poppy
<i>Argemone corymbosa</i> Greene	Mojave prickly poppy
<i>Argemone polyanthemos</i> (Fedde) G.B. Ownbey	Crested prickly poppy
<i>Argemone sanguine</i> Greene	Red prickly poppy
<i>Argemone glauca</i> (Nutt. ex Prain) Pope	Pua kala (Hawaii)
<i>Argemone squarrosa</i> Greene	Hedgehog prickly poppy
<i>Argemone gracilentia</i> Greene	Sonoran prickly poppy

#### ACTIVE PHYTOCHEMICALS OF *Agemone mexicana*:

*A. mexicana* was reported lots of active phytochemicals found from different parts of the plant like Berberine<sup>[24,25,26]</sup>, Dehydrocorydalmine<sup>[27]</sup>, (+)-Reticuline<sup>[28]</sup>, Protopine<sup>[24,25,26,29,30]</sup>, Allocryptopine<sup>[25, 26,29]</sup>, Chelerythrine<sup>[28]</sup>, Sanguinarine<sup>[30]</sup>, (+)-Argenaxine<sup>[28]</sup>, (+)-Higenamine<sup>[28]</sup>, Oxyberberine<sup>[27]</sup>, N-Demethyloxysanguinarine<sup>[28]</sup>, Pancorine<sup>[28]</sup> (±)-6-Acetyl Dihydrochelerythrine<sup>[31]</sup>, Angoline<sup>[28]</sup>, B-Amyrin<sup>[32]</sup>, Cysteine<sup>[32]</sup>, Phenylalanine<sup>[32]</sup>, Isorhamnetin-3-O-B-D-Glucopyanoside<sup>[32]</sup>, β-sitosterol<sup>[33-36]</sup>, Dihydropalmitate Hydroxide<sup>[24,37]</sup>. Argemone oil or oil found from seed also contains argemonic acid<sup>[38]</sup>, palmitic acid<sup>[39]</sup>, stearic acid<sup>[39]</sup>, myristic<sup>[39]</sup>, oleic and linoleic acids<sup>[39]</sup>, arachidic acid.<sup>[39]</sup>

#### PHARMACOLOGICAL ACTIVITY OF *Argemone mexicana*:

*Argemone mexicana* shows great pharmacological activity and it is being used from ancient times. Traditionally the extract from whole plant is beneficial for different types of pharmacological activities like Anti-fertility activity<sup>[24,37]</sup>, Effect on ileum contraction in guinea pig<sup>[25,29]</sup>, Antimalarial activity<sup>[26]</sup> Antifungal activity<sup>[27]</sup>, Cytotoxic activity<sup>[28]</sup>, Molluscicidal activity<sup>[30]</sup>, Anti-HIV activity<sup>[31]</sup>, Anti-inflammatory & analgesic

activity<sup>[32]</sup>, Used in chronic disease and leprosy Inflammation and Antioxidant<sup>[33,34,35,36]</sup>. The aerial parts extract of the plant exhibit anti-parasite activity<sup>[40]</sup>. Methanol extract at a dosage of 200 mg/kg body weight was found analgesic, anxiolytic and sedative effects<sup>[41]</sup>. In addition, acetone leaf extract of the plant showed significant anti-termitic activity<sup>[42]</sup>, Antidiabetic activity<sup>[43-45]</sup>, Anti-stress and antiallergic activity<sup>[46]</sup>, Vasoconstrictor and vasorelaxant effects<sup>[47]</sup>, Nematicidal activity<sup>[48-51]</sup>, Antifeedant activity<sup>[52]</sup>, Lousicidal activity<sup>[53]</sup>, Fungitoxic activity<sup>[54,55,56,57]</sup>, Anthelmintic activity<sup>[58,59]</sup>, Larvicidal activity<sup>[60-62]</sup>, Anticancer activity<sup>[63,64]</sup>, Antihepatotoxic activity<sup>[65,66]</sup> and Wound healing activity.<sup>[67-71]</sup>

A brief overview of bioactive compounds extract from different parts of *A. Mexicana* with its pharmacological activity mentioned in Table V:

Plant Parts	Active Constituents	Pharmacological activity	Reference
Leaves	Berberine	Anti-fertility activity	[24]
		Effect on ileum contraction in guinea pig	[25]
		Antimalarial activity	[26]
Whole Plant	Dehydrocorydalmine	Antifungal activity	[27]
Apigeal Parts, Aerial Parts	(+)-Reticuline	Cytotoxic activity	[28]
Apigeal Parts, Aerial Parts	Protopine	Anti-fertility activity	[24]
		Effect on ileum in guinea pig	[29], [25]
		Molluscicidal activity	[30]
		Antimalarial activity	[26]
Apigeal Parts,	Allocryptopine	Effect on ileum in guinea pig	[29], [25]
		Antimalarial activity	[26]
Whole Plant	Chelerythrine	Cytotoxic activity	[28]
Seed	Sanguinarine	Molluscicidal activity	[30]
Aerial Parts	(+)-Argenaxine	Cytotoxic activity	[28]
	(+)-Higenamine	Cytotoxic activity	[28]
Whole Plant	Oxyberberine	Antifungal activity	[27]
Aerial Parts	N-Demethyloxysanguinarine	Cytotoxic activity	[28]
Aerial Parts	Pancorine	Cytotoxic activity	[28]
Whole Plant	(±)-6-Acetyl	Anti-HIV activity	[31]
Whole Plant	Dihydrochelerythrine		
	Angoline	Cytotoxic activity	[28]
Leaves	B-Amyrin	Anti-inflammatory & analgesic activity	[32]
	Cysteine	Anti-inflammatory & analgesic activity	[32]
	Phenylalanine	Anti-inflammatory & analgesic activity	[32]
	Isorhamnetin-3-O-B-D-Glucopyanoside	Anti-inflammatory & analgesic activity	[32]
Roots	β-sitosterol	Used in chronic disease and leprosy Inflammation, Antioxidant, Antifungal	[33], [34], [35], [36]
Seed	Dihydropalmitine Hydroxide	Anti-fertility activity	[24,37]

#### ANTIDIABETIC ACTIVITY OF *Argemone mexicana*:

*Argemone mexicana* plant aerial part was evaluated to test the hypoglycaemic activity of the plant. *Argemone mexicana* extract with dosage of 200mg/kg and 400 mg/kg decreases blood glucose level in normal and experimentally – induced diabetic rats. It also affected the increasing serum cholesterol and triglycerides. This effect is directly proportional to the level of dose of *Argemone mexicana*. Higher the dose more is the hypoglycaemic effect<sup>[43]</sup>.

In Alloxan induced diabetic rats, with the addition of ethanolic and aqueous extract at a dose level of 400 mg/kg, there is a decrease in the blood sugar level in a significant manner. A similar kind of effect is also found with the addition of Chloroform and hydroalcoholic aqueous extract in Wistar rats<sup>[44], [45]</sup>.

In vitro studies of hydroalcoholic and alkaloidal extracts of *Argemone Mexicana* displayed the highest inhibitory activity of aldose reductase<sup>[44]</sup>.

#### WOUND HEALING ACTIVITY OF *Argemone mexicana* :

Extraction of *A. mexicana* shows significant result with established drug nitrofurazone<sup>[67]</sup>. *Leaves extract of A mexicana* contain sterols, alkaloids, proteins and carbohydrates helps to reduce wound healing in albino rat model by Patil and hisgroup<sup>[68]</sup>. Wound healing activity of different extracts of *A. mexicana* leaves investigated using excision, incision and dead space wound models in Wistar albino rats<sup>[69]</sup>.

Methanol extract of *A. Mexicana* leaves shows better and faster result in wound healing respect of petroleum ether, chloroform, and aqueous extracts of the leaves<sup>[70]</sup>.

That the ethanolic extract ointment of root of *A. Mexicana* possesses better wound healing potency compared with gentamycin (0.3% w/w) in Swiss albino rats<sup>[71]</sup>

Extract from different parts of the plant using different types of solvents shows following positive activity in different doses mentioned in Table VI.

Pharmacological Effects	Extracts	Concentration	Pharmacological Activity	References
Anti-Diabetic	Ethanollic + Water	40 mg/kg	Result shows balance in hypoglycemic activity.	[37], [38]
Anti-Oxidant	Methanolic	100 µg/ml	It shows Anti-oxidant activity.	[39], [40], [41]
Anti-Fungal	Cold aqueous + Methanol	40 µg	Fungal growth resistance found.	[42]
Anti-Cancer	Alkaloid	50 µg to 310 µg	Cytotoxic effects are seen.	[43], [44]
Anti-Fertility	Isoquinoline alkaloid	300 mg/kg	The Relative anti-spermatogenic was reported to be 9 > 2 > 44	[45]
Wound Healing Activity	Methanolic Extract	10% w/w	Significant effect on wound healing than other extract	[67-71]

## II. CONCLUSION:

There is a popular saying, "There are two sides to every coin", which means there is both advantages and disadvantages to each and everything. Similarly, *Argemone mexicana*, being a weed, which is used as an adulterant in cooking oil and has numerous side effects, also has many physiological and chemical aspects, along with Wound healing and Antidiabetic properties, about which we made a review here.

Studies show that aerial parts of *Argemone mexicana* are used for its antidiabetic property. The level of dose of *Argemone mexicana* is directly proportional to the antidiabetic property of the plant. Higher the dose, higher is the hypoglycaemic activity.

Experiments related to wound healing properties proved that extract such as chloroform, methanol and aqueous extract of *Argemone mexicana* has wound healing properties.

So it's us who have to decide whether to use the plant for its beneficial purpose or to misuse it.

Furthermore studies should be done for the in-depth knowledge and understanding about its physiological and other beneficial health aspects, so that one day it can be used in mainstream medicine.

**CONFLICT OF INTEREST:** Nil

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