

Review on Argemone Mexicana Plant Leaves Used as Diuretic in kidney Stones Treatment

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Date of Submission: 03-04-2026

Date of Acceptance: 14-04-2026

I. Introduction of the Herbal Plant

According to a recent WHO definition, traditional medicine (including herbal medications) includes therapeutic practices that have been used for hundreds of years or more before modern medicine developed and spread, and that are still in use today. Traditional medicine is the culmination of generations of indigenous medical practitioners' therapeutic experiences. Traditional preparations include organic materials, minerals, and medicinal plants, among other things. Only traditional medicines that primarily employ preparations of medicinal plants for therapeutic purposes are considered herbal drugs. Their usage in Indian, Chinese, Egyptian, Greek, Roman, and Syrian texts is documented as early as 5000 years ago. The Rigveda, Atharvaveda, Charak Samhita, and Sushruta Samhita are examples of classical Indian texts. Therefore, the rich traditions of ancient civilizations and scientific heritage have been the source of herbal medicines and traditional medicaments [1]



Fig 1. Herbal Plant [2]

Abstract:

Many indigenous medical systems have long utilized the well-known medicinal herb Argemone Mexicana L. (Mexican prickly poppy), a member of the Papaveraceae family, for its lithotriptic, diuretic, and anti-inflammatory qualities. The diuretic effect of Argemone Mexicana leaves and their possible use in the treatment of kidney stones (urolithiasis) are

the main topics of this study. The percolation method was used to extract the shade-dried leaves using aqueous and hydroalcoholic solvents. Alkaloids, flavonoids, phenolic compounds, tannins, saponins, and terpenoids-constituents known to affect renal physiology and diuretic mechanisms, were detected in the leaf extract by phytochemical screening. Comparing Argemone mexicana leaf extract to control groups revealed a significant increase in urine pH, sodium, and potassium ion excretion, and urine output. These effects showed increased renal clearance activity and were similar to those of the common diuretic furosemide. In order to prevent and treat kidney stones, the diuretic effect helps to dilute urine solutes, reduce crystallization, and facilitate the expulsion of small calculi. Natural flavonoids and alkaloids may work in concert to protect antioxidants and improve renal tubular function. Accordingly, the results support the traditional use of Argemone mexicana leaf extract in the treatment of nephrolithiasis by indicating that it has strong diuretic and lithotriptic properties. To identify the bioactive substances causing these effects and confirm their safety and effectiveness in human applications, more pharmacological and clinical research is advised.

Keywords: Argemone Mexicana, Diuretic Activity, Hydroalcoholic Extract, Phytochemicals, Kidney Stones, Nephrolithiasis, Renal Function.

INTRODUCTION

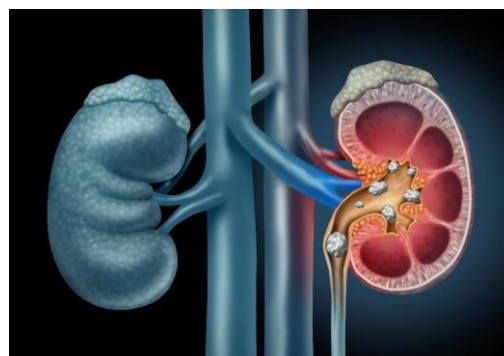


Fig 2. Kidney Stone Disease [7]

Kidney Stone:

Crystalline concretions that form in the urinary tract are known as kidney stones, renal calculi, or urolithiasis. They arise from the precipitation and crystallization caused by the supersaturation of specific minerals and salts in urine. Stones range in size from tiny grains that resemble sand to several centimeters. The condition is common throughout the world, with a lifetime risk estimated at 10–15% in developed nations and steadily increasing in developing nations as a result of dietary changes, lifestyle changes, and dehydration brought on by climate change. One of the most excruciating urological conditions is kidney stones. Nearly 50% of patients experience another stone within five to ten years if preventive measures are not taken, indicating high recurrence rates.[1] [2]

Epidemiology:

- The male - to - female ratio is approximately 3:1, meaning that men are more likely than women to be impacted.
- Ages 20 to 40 have the highest incidence.
- lifestyle, genetics, metabolic disorders, and hot, dry climates.[1],[2]

Kidney Stone Types:

1. The most prevalent kind of stones is **calcium oxalate stones** (70–80%).
Caused by low citrate levels, hyperoxaluria, and hypercalciuria. Nuts, tea, chocolate, spinach, and other foods raise the risk.
2. Renal tubular acidosis and elevated urine pH are associated with **calcium phosphate stones** (5–10%).
3. Urine that is consistently acidic (pH < 5.5) can develop **uric acid stones** (5–10%). Linked to a high purine diet, obesity, and gout.
4. **Structural Stones** (10–15%) Made of ammonium phosphate and magnesium. Occurs as a result of recurrent UTIs caused by bacteria that produce urease (Klebsiella, Proteus).
5. Less than 2% of people have **cysteine stones**. Rare and inherited. As a result of cystinuria, a cystine reabsorption defect.[5]

Clinical Features & Symptoms:

- Severe flank pain (renal colic) that radiates to the groin.
- Hematuria, or blood in the urine.
- Nausea and vomiting brought on by discomfort.
- Dysuria, or painful urination.
- More frequent and urgent urination.

- Silent stones are occasionally unintentionally found during imaging. [2]

Diagnosis

1. Imaging The gold standard is the non-contrast CT scan (NCCT), which has a sensitivity of >95%.
 - o Ultrasound (USG): recommended for children and pregnant women.
 - o KUB X-ray: identifies calcium stones, or radiopaque stones.
2. Urinalysis: Hematuria, crystals, infection, and pH variations.
3. Blood tests for creatinine, uric acid, and calcium.
4. Stone analysis assists in customizing preventative measures.[3]

Conventional Methods

1)Health Care Administration

- NSAIDs (Ibuprofen, Diclofenac) for pain relief.
- Medical expulsive therapy (MET): Tamsulosin and other alpha-blockers relax the ureter, facilitating the passage of stones smaller than 10 mm.
- Antibiotics plus final removal for infection-related stones. Urine can be alkalinized with potassium citrate or sodium bicarbonate to prevent uric acid stones.[3]

2. Procedural and Surgical Management

- Extracorporeal Shock Wave Lithotripsy (ESWL): non-invasive, breaks up stones smaller than cm.
- Uteroscopy (URS): Laser lithotripsy for endoscopic removal.
- Percutaneous Nephrolithotomy (PCNL): For stones larger than 2 cm.
Laparoscopic or open surgery is rarely required.[3]

Traditional and Herbal Treatments:

Urinary stones have long been treated with herbal medicine, particularly in Ayurveda, Siddha, and Traditional Chinese Medicine. Among the extensively researched plants are: [4]

1. **Phyllanthus niruri (Bhui Amla/Chanca Piedra)**



Fig 3. Phyllanthus niruri,

- Prevents the crystallization of calcium oxalate. A Clinical trial decreased the recurrence of stones following ESWL.[4]

2. Punarnava, or Boerhavia diffusa



Fig 4. Boerhavia diffusa (Punarnava)

- Prevents the development and recurrence of stones.
- It has anti-inflammatory and diuretic properties. [4]

3. Gokshura, or Tribulus terrestris



Fig 5. Tribulus terrestris (Gokshura)

- Decreases kidney oxalate deposition.
- Studies on animals demonstrate an antiurolithiatic effect.[4]

4. Zea mays (Corn Silk)



Fig 6. Zea mays (Corn Silk)

- Zea mays (Corn Silk) is a traditional diuretic that clears the urinary tract. [4]

5. Mexican Prickly Poppy, or Argemone mexicana



Fig 7. Mexican Prickly Poppy, or(Argemone mexicana)

- Extracts from Argemone mexicana leaves and roots exhibit diuretic and antiurolithiatic properties both in vitro and in vivo.
- Traditionally used in Mexico and India for kidney ailments. [4]

INTRODUCTION

Argemone Mexicana Plant



Fig 6. Argemone Mexicana Plant

Argemone Mexicana

The Mexican poppy is a plant that grows every year. It typically blooms from October to November after germinating in the fall. The availability of moisture is the primary determinant of its life cycle in other regions of the state. Only

seeds can be used to reproduce Mexican poppies. Prickly poppies from Mexico. The Mexican poppy can reach a height of one meter. It features hollow stems, a "pepper shaker" seed capsule, and typical poppy flowers. Its prickly, toothed leaves give it a thistle-like appearance before it flowers. The plant has waxy marbling on its leaves and is either bluish-green or greyish-green in color. Up to 20 centimeters long, the silvery green leaves have deep, regular lobes and white veining. The leaf's underside has a few prickles along the midribs, but its upper surface is smooth. Unlike rosette leaves, stem leaves have no stalk and adhere to the stem of the plant. The whitish, cylindrical stems are speckled with prickles. The stems release a milky, yellowish sap when they break. The flowers have a diameter of roughly 6 cm. They have a dark red stigma with three or six lobed sections encircled by four pale yellow or cream petals.[8], [11]

PLANT PROFILE

The classification of *Argemone Mexicana*:-

Domain	Eukaryotes
Kingdom	Plantae
Phylum	Spermatophyta
Subphylum	Angiospermae
Class	Dicotyledonae
Order	Ranunculales
Family	Papaveraceae
Genus	Argemone
Species	Argemone mexicana

Table No 1. Plant Profile [8],[10]

Synonyms (Botanical / Scientific)

- *Argemone hispida* Willd.
- *Argemone mexicana varalba*
- *Argemone intermedia* Sweet
- *Argemone ochroleuca* Sweet [8]

Vernacular Names in Different Countries & Languages:-


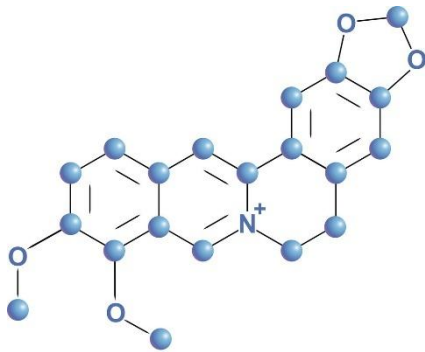

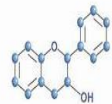
Region Language	Local Common Name	Meaning Notes
English (Global)	Mexican prickly poppy, Mexican poppy, yellow thistle	Describes origin & prickly nature
India (Hindi)	Siyāl kāṭā, Kateri	Refers to a prickly plant.
India (Marathi)	Piwli Bhui, Kohala, Dhotra	"Yellow ground melon-like"
India (Sanskrit)	Swarna Kshiri, Brahmadandi	"Golden milky latex"
Telugu (India)	Darudī	Medicinal folklore usage
Gujarati (India)	DarudiUkando, Kanteri	Used in folk remedies
Kannada (India)	Dattura gida, Huluhakki gida	Related to thorny plants
Nepal	Sialkanta	Same as Hindi/Bengali
Mexico / Spanish	Cardo amarillo, Amapola de México	"Yellow thistle", "Poppy of Mexico"
Brazil / Portuguese	Cardo-de-México, Papoula espinhosa	"Thorny poppy"
Africa (Swahili)	Mkonge-mexico	Regional adaptation
USA (Southwest)	Mexican prickly poppy	Naturalized weed
Philippines	Kasubha-sabaan	Folk usage
Africa (Yoruba, Nigeria)	Èpo-pupa	Refers to yellow latex


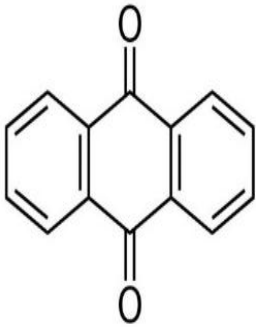

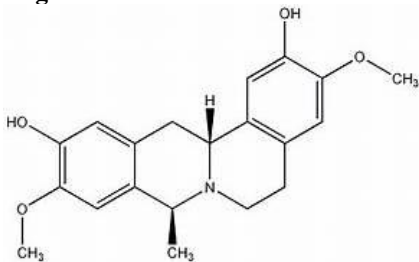
Table No 2 . Vernacular Names in Different Countries & Languages[10]

Plant description of Argemone Mexicana parts [8],[9]

Parts used:-

- Stem
- Leaves
- Flower
- Seed
- Latex
- Root

Plants parts	Description	Chemical Constituents	Medicinal properties
Stem 	Stem is cylindrical to rectangular, swish, and pale chromatic. The complete Stem is covered with terribly short hairs and a few long yellow spines.	- Alkaloids (~0.25%) Mainly Protopine, Berberine, Coptisine, Allocryptopine, Chelerythrine, Dihydro-Chelerythrine  Berberine	Leprosy, Malaria, Jaundice, Rheumatism, Pain, Inflammation, Skin Disease, Fever, Piles, Warts, Dysentery, Tumors, and Worms Infestations.
Leaves 		Alkaloids, Flavonoids, Phenolics, Tannins, Terpenoids, Coumarins, Quinones, Fats/Oils, Carbohydrates, Steroids, and Phenols.  FLAVONOIDS	Diabetes, Fever, Ulcers Maintain Blood Circulation and Cholesterol Level Antivenom Anti-Inflammatory Stomach Aches, Muscular Pain, Cough, Wounds, Ulcer, Warts, Cold Sores, Cutaneous Infections, Skin Diseases, Itches, Etc.
Flower	The flowers are large, 4 to 7 cm in diameter. There are 6 round petals,	Alkaloids, Flavonoids, Saponins, Tannins, Phytosterols, Triterpenoids, Glycosides, Anthraquinones, Phenols. - Also Contains Gallic Acid, Rutin,	Expectorant, Antioxidant.

	<p>bright yellow.</p>	<p>Caffeic Acid, Quercetin, and Ferulic Acid.</p>  <p>General Anthraquinone Structure</p>	
<p>Seed</p> 	<p>Seeds are produced in large quantities, small and black, 1.7-2 mm x 1.6 mm.</p>	<p>Argemone Oil (22–40%) Rich In Linoleic Acid (54–61%), Oleic Acid (21–33%). - Toxic Alkaloids Including Sanguinarine, Dihyrosanguinarine, Argemonine, Berberine, Protopine, And Others</p> <p>Argemonine</p> 	<p>Purgative, Laxative, Antidote To Snake Poisoning, Toothache. Diuretic, Anti-Inflammatory, Malarial Fever, Leprosy, Scorpion Sting, Warts, Cold Sores, Wound Healing, Skin Disease, Itches, Jaundice, Demulcent, Emetic, Expectorant, Sedative For Children.</p>
<p>Latex</p>	<p>Contain poisonous sap, making them toxic and bitter to grazers</p>	<p>Berberine And Protopine,</p>	<p>Treat Boils, Scorpion Sting, Dermatitis, Disinfectant, Dropsy, Jaundice, Skin Disease, Leprosy, Blisters, Indolent Ulcers, Conjunctivitis, Inflammations, Burning Sensation and Malarial Fever, Rheumatic Pain.</p>

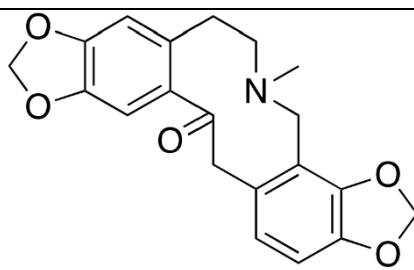

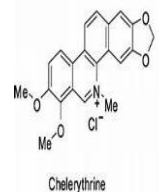
		 <p>Protopine</p>	
<p>Root</p> 	Hepatoprotective activity.	<p>Alkaloids (~0.25%) — Mainly Protopine, Berberine, Coptisine, Allocryptopine, Chelerythrine, Dihydro-Chelerythrine.</p>  <p>Chelerythrine</p>	<p>Chronic Skin Disease, Leprosy, Inflammations, Anthelmintic, Antibacterial, Cytotoxicity, Wound Healing, Antioxidant, Antifungal Agent, Expectorant, Antidote To Snake Poison, Constipation, Flatulence, Colic, Malarial, Fever, and Vesicular Calculus.</p>

Table no 3 . Plant description of Argemone Mexicana parts[8],[9],[12],[13],[14]

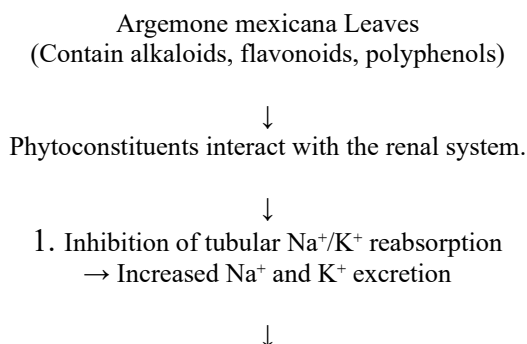
Argemone mexicana Leaves' Diuretic Effect:

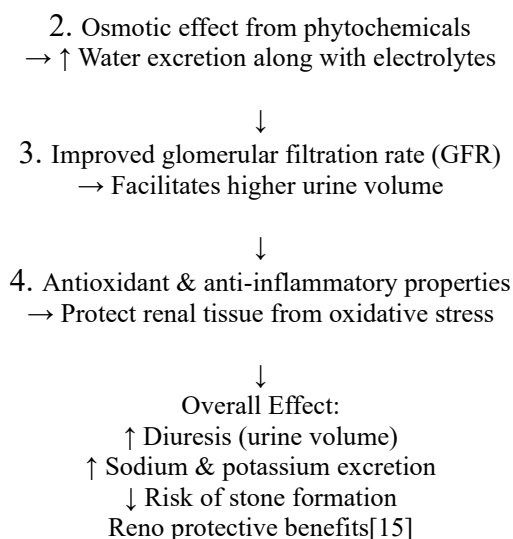
Urine volume significantly increased in comparison to the control. o The excretion of electrolytes (Na, K, and Cl) was noticeably increased. o In animal models, activity was similar to that of furosemide at comparable dosages.[15]

Likely Mechanism: Osmotic diuresis may result from the inhibition of tubular sodium reabsorption by flavonoids, alkaloids (Berberine, Chelerythrine, Protopine), and other phytoconstituents. [15]

Diuretic Activity in Kidney Stone Treatment

□ **Mechanism:-**





Since increasing urine volume aids in the removal of small calculi and inhibits the aggregation of crystals, many herbal remedies used to treat urolithiasis are diuretics.

The use of *Argemone mexicana* leaves for stone expulsion makes sense if their diuretic action has been demonstrated.

Extracurricular Activities:

Antioxidant: lessens oxidative damage to the kidneys.

Anti-inflammatory: may lessen stone-related pain and swelling. [11]

II. Future Scope:-

Future research should concentrate on bridging the gap between contemporary scientific research and traditional herbal knowledge. To determine the active ingredients in *Argemone mexicana* and learn how they help prevent calcium oxalate crystal formation, promote urine flow, and protect against oxidative stress, more thorough chemical and biological investigations are required. Clinical trials and animal studies are required to verify the safety, efficacy, and appropriate dosage of these herbal remedies in comparison to conventional medications. Utilizing contemporary instruments like biotechnology, molecular modeling, and omics technologies can offer a deeper understanding of how these herbs function at the molecular level. Creating standardized formulations or polyherbal combinations could enhance their absorption and overall benefits. The development of safe, dependable, and environmentally friendly herbal treatments for kidney stone prevention and

management will require close cooperation between traditional healers, scientists, and medical professionals.

III. Conclusion:

Kidney stones are a complex condition that involves genetics, metabolic abnormalities, diet, and lifestyle. Pain, recurrence, and complications result in significant morbidity.

Although modern medicine offers efficient treatments, prevention is just as important. Herbal remedies like *Argemone mexicana*, *Boerhavia diffusa*, *Tribulus terrestris*, and *Phyllanthus niruri* exhibit encouraging outcomes as crystal inhibitors and natural diuretics, making them useful adjunct treatments. To manage kidney stones holistically, future research should concentrate on clinical validation of herbal remedies that integrate traditional knowledge with contemporary science. Leaf extracts from *Argemone mexicana* have shown encouraging anti-urolithiasis activity in vitro, competing with the common drug Cystone in preventing the formation of calcium oxalate crystals. Its traditional use in Mexican herbal medicine is consistent with recent research showing that it has antioxidant, litholytic, and diuretic properties.

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