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## A COMPREHENSIVE PHARMACOLOGICAL REVIEW ON *ABRUS PRECATORIUS* LINN.

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### ABSTRACT

*Abrus precatorius* [Fabaceae] also known as Indian liquorice has been used as medicine since very ancient times. Plants are a great source of distinct natural components used to build medications to treat illnesses. In traditional folkloric medicine, the leaves, root, seeds are used. Numerous studies on *Abrus precatorius* have been carried out. Indian Liquorice [*Abrus precatorius*] found to exhibit a multitude of biological actions, including antimicrobial, anti-tumor, anti-diabetic, anti-convulsant, and anti-malarial properties, according to pharmacological tests. *Abrus precatorius* has some possible medical benefits, but it also has significant poisonous effects since it contains a component called "abrin," which is lethal to humans. The current review summarizes about *Abrus precatorius* pharmacological activities.

**Keywords:** *Abrus precatorius*, Fabaceae, Abrin, Pharmacological activity

### INTRODUCTION

Plant components have the ability to cure and relieve pain, plants inclined as medicines for a long time and are still useful today. Rural

population depends on these medicinal plants for their main healthcare needs. The search by scientists for novel pharmacologically active

components from natural sources, including plants, animals, and microbes, served as the foundation for the discovery of numerous therapeutically valuable pharmaceuticals with medicinal properties within the past 20 years. The *Abrus precatorius* [Fabaceae] has been practised as medicine since very ancient times. People in some tribal areas consume *Abrus precatorius* Linn. leaves to treat mouth

ulcers. Additionally, it includes tri-terpenoid saponins, which are likely to cure sores, ulcers, cuts, and scratches on the neck [1]. Although more information still has to be streamlined, it is already recognized as a valuable source of distinctive natural material for the evolution of manufactured products as well as medications against various ailments.



*Abrus precatorius* leaves



*Abrus precatorius* Seeds

**VERNACULAR NAMES [2]**

**English** : Indian liquorice  
**Tamil** : Kuntumani  
**Telugu** : Gurugunja

**Malayalam** : Kunni  
**Sanskrit** : Gunja  
**Assam** : Rati  
**Beng.** : Kunch, Shonkainh

<b>CLASSICAL NAMES</b>	<b>Kakadani</b>
	<b>Kakachinchi</b>
	<b>Kakavallari</b>
	<b>Uchchata</b>
	<b>Raktika</b>
	<b>Kakapeelu</b>

**TAXONOMICAL CLASSIFICATION [3]**

**Kingdom** : Plantae  
**Division** : Magnoliophyta  
**Order** : Fabales  
**Family** : Fabaceae  
**Subfamily** : Faboideae

**Genus** : Abrus  
**Species** : precatorius

**BOTANICAL DESCRIPTION**

Climbers made of wood. Leaflets: 10–20 in opposite pairs, ovate, obovate, or oblong; leaves paripinnate. A dense tuft of flowers,

racemes are petite than leaves. Pale-purple to golden flowers that are subsessile. rectangular, three–five seeded pods. Ovoid, shiny, seeds are red with a black mark encircling the hilum or black with a white spot [4, 5].

**HABIT**

Climbing shrub

**HABITAT**

Deciduous forest

**DISTRIBUTION:**

India is the natural home of the plant *Abrus precatorius*, which is endemic to Southeast Asia. It is found in all of the planet's tropical and subtropical nations. It can grow as high as 1200 meters [6].



The map's reddish boundaries indicate the geographical distribution of Indian liquorice [*A.precatorius*] in India [7]

**CHEMICAL CONSTITUENTS: [8]**

Abrasine, abrol, abrine, abruquinones, abrusgenic acid, methyl abrusgenate,

abruslactone A, Trigonelline and its gallic acid ester, glycyrrhizin, pinitol, precol, abrol.

**ETHNOMEDICINAL USES [8, 9]**

PARTS	USES
LEAF	The leaves of the <i>Abrus precatorius</i> are likely to relieve cough, fever and cold. Useful in biliousness and in leucoderma, itching and skin complications.
ROOTS	Treat jaundice, haemoglobinuric bile, diuretic, tonic and emetic properties, hepatitis, bronchitis, chewing root is apt to cure snake bites.
SEEDS	Purgative, aphrodisiac and anti-ophthalmic, useful in dysentery and have anthelmintic activity. Seeds are venomous, crushed seeds are used for poisoning cattle for homicidal purpose and as abortifacient, To treat worm infections, one teaspoon of powdered <i>Abrus precatorius</i> dry seeds is administered once a day for 2 days.

## PHARMACOLOGICAL ACTIVITIES

### Anti-fertility activity

In 2018, Zaranappa and Deekshitha MS investigated that methanolic extract of *Abrus precatoris* exhibits contraceptive action, according to a preliminary qualitative phytochemical study of the crude seed extract, which also shows an existence of hormone and anti-fertility activity on female albino rats [10].

In 1983, Zia *et al.*, evaluated to separate and characterize the compounds that are affecting the female albino rats' reproductive activity, *A. precatorius* seeds were deployed. The rat's estrous cycle was completely interrupted by injecting the whole alcoholic extract for 10 to 12 days. Five days of injections of the same extract prior to mating caused the condition. Similar activity was recorded in the unsaponifiable fraction of the extract. Unsaponifiable fraction was further fractionated into 9 fractions by silica gel chromatography using petroleum ether:ether combination. *A. precatorius* seed were used in order to isolate and identify the substances that are influencing the reproductive activity of the female albino rats. By injecting the entire alcoholic extract, the rat's reproductive cycle was entirely disrupted for a period of 10 to 12 days. The condition

was brought on by a five-day span of injections with a similar extract prior mating. Only two parts, PEP 103 & PEP 104, were found to be biologically active all of the fractions whose biological activity was evaluated. When PEP 104 was injected into animals for ten to twelve days, it changed their cyclic pattern, reduced the amounts of progesterone and estradiol in their plasma, and lessened the weight of their ovaries. The active ingredient appears to disrupt the female albino rat's cyclic rhythm by changing the ovaries' steroidal metabolism [11].

### Anti-viral activity

In 1995, Otake T *et al.*, found that an ethanol/water 1:1 ratio extract of the existing parts at a concentration of 50 mcg/ml in cell culture was torpid against the Vaccinia and Ranikhet viruses. Using the cell culture method, extracts of the Indian liquorice dried seeds were also ineffective against the HLTV-1 virus. Other researchers found similar results [12].

### Anti-diabetic activity

In 2021, Boye A *et al.*, reported that adult Sprague-Dawley rats were given daily sequential injections of nicotinamide (48 mg/kg; ip) and Alloxan (120 mg/kg; ip) over seven days in order to induce diabetes mellitus (DM). Rats with stable fasting blood glucose for seven days after receiving a

Nicotinamide/Alloxan injection were classified as diabetics, with the exception of control rats, who had FBG of 4.60 mmol/L. These rats were then randomly assigned to one of two groups: metformin or *A. precatorius* leaf extract, and they received daily treatment for eighteen days. Using a rat-specific ELISA kit, blood was drawn to estimate serum insulin, glucagon, and GLP-1. Alpha ( $\alpha$ )-amylase and  $\alpha$ -glucosidase enzymatic activity were calculated in correlation with plant extract. The initial FBG were reduced dose-dependently by *A. precatorius* extract in comparison to metformin (43.63%) and the model (4.34%) [13].

Alloxan diabetic rabbits were used to test the anti-diabetic effects of a 50 mg/kg chloroform–methanol extract of seeds of *A. precatorius*. The percentage drop in glycemia that was seen following treatment with the chloroform-methanol extract at various intervals indicates that the chloroform–methanol extract of seeds of *A. precatorius* has anti-diabetic effects with Trigoneline that is comparable to chlopropamide. In a different study, rat models were used with a 1:1 ethanol/water extract of the existing portions of *Abrus precatorius* at a dose of 250 mg/kg, and the results showed that this treatment only reduced the blood sugar level by 30% [4].

#### Anti-oxidant activity

In 2009, Ranju S Pal studied that *in-vitro* technique were likely to assess the antioxidant activity of an ethanol extract of *Abrus precatorius* seed. Total flavonoids were identified to be 21 mg/g of extract calculated as rutin equivalent ( $r^2=0.9985$ ) and total phenolic compound was identified to be 95 mg/g of extract calculated as gallic acid equivalent ( $r^2=0.9976$ ) in the ethanol extract of *Abrus precatorius*. The ethanol extract has strong antioxidant activity across various enzyme levels when differentiated to, butylated hydroxytoluene (BHT) [14].

#### Alzheimer's activity

In 1998, Zambenedetti P et al., studied by identifying the activation of microglial cells (MGCs) using glycohistochemistry, plant has been examined in an Alzheimer's disease model. The cerebral white matter contains rod-like cells that are recognized by *Abrus precatorius* agglutinin as MGC. These cells are especially numerous in the regions closest to oligodendroglial cells. The plant's active constituent lectin was used to histochemically detect the activation of microglial cells in autopic brain samples from Alzheimer's disease patients [15].

In 2019, Choudhary GP, Jain AP reported that the soluble fraction of leaves containing *A. precatorius* ethylacetate (APEA) significantly improved acquisition,

retention, and retrieval at doses of 150 and 300 mg/kg. However, when given at a dose of 300 mg/kg for seven days, *A. preparatorius* aqueous fraction (APAqs) of methanol extract does not improve learning as well as memory retention. APEA fraction was discovered to have a percentage of inhibition of  $91.33 \pm 0.33$  against AChE. Additionally, both fractions were discovered to be safe, and mice given 2000 mg/kg orally did not die [16].

#### **Anti-epileptic activity**

In 2005, Moshi MJ studied that leaves of indian liquorice have anti-epileptic efficacy when boiled with water, and they are taken by mouth as three table spoonfuls twice daily as part of a dosing regimen for the analysis of epilepsy, according to a cross-sectional study conducted in Temeke District [17].

#### **Anti-convulsant activity**

In 2012 shenoy A et al., evaluated the ethanolic extract (EE) of *A. precatorius* leaves exhibited anticonvulsant effectiveness against convulsions generated by PTZ, Picrotoxin, and Maximal electroshock MES at dosages of 100, 200, and 400 mg/kg. The reference standards are phenytoin and diazepam. *Abrus precatorius* extract decreased the duration of hind limb extension in the MES-induced convulsion test and significantly postponed the start of clonic seizures generated by PTZ and picrotoxin at both the medium and high

doses. According to a phytochemical analysis, *A. preparatorius* leaves contain flavonoids, triterpenoids, saponins, reducing sugars, phenolic compounds, and glycosides. The outcomes show that *A. precatorius* ethanolic extract may aid in the management [18].

#### **Neuromuscular blockers**

In 1984, Wambebe C and Amosun SL studied that both toad rectus abdominis and rat phrenic nerve-diaphragm muscle preparations' acetylcholine-induced contractions were reduced by the ethanol extract of the leaves. The effects were reversible and concentration-dependent. The extract also caused flaccid paralysis in young chicks when given intravenously. The ethanol extract had no effect on direct electrical stimulation of the rat diaphragm. The ethanol extract's inhibitory effect on the rodent phrenic nerve-diaphragm preparation was enhanced by decreased  $Ca^{2+}$  ions, enhanced  $Mg^{2+}$  ions, or decreased  $K^{+}$  ions. As a result, the ethanol extract's neuromuscular blocking pattern resembled that of d-tubocurarine.[19]

#### **Anti-inflammatory activity**

In 2024, Sukanya V and Thirumal M studied that a compound's possible anti-inflammatory or cytoprotective qualities may be indicated by inhibition of this denaturation process. As a percentage of denaturation, the control group is used. A mean inhibition of

23.81% was observed when the macerated oil was concentrated at 500 µg/ml, indicating a robust prevention of albumin denaturation. An anti-inflammatory agent's potential is demonstrated by the oil's IC50 value of 77.43, which represents the concentration at which 50% of albumin denaturation is inhibited [20].

#### Anti-microbial activity

In 2009, Bobbarala V and Vadlapudi V conducted study using the agar well dissemination technique, the in vitro antibacterial activity of hexane, chloroform, and methanolic raw extracts of *Abrus precatorius* seeds was assessed against 10 clinical isolates. Several stock concentrations were tested against the test microorganisms in order to determine the minimum inhibitory concentration values. *Enterococcus. f* was the most resistant organism at the 400 microg–4 microg/ml concentrations of the extracts used. Comparing methanolic seed extracts to hexane and chloroform extracts revealed their potency. This study shows that *A. precatorius* has strong antibacterial action, especially in the methanolic extracts from the seeds.[21]

#### Wound curative activity

In 2013, Abhilasha Shourie, Kuntal Kalra reported that *Abrus precatorius* make it a valuable tool for wound care. Rats' wound-healing capacity was assessed in a study using varying amounts of ethanolic extracts of the

stem of *A. precatorius*. Using an excision wound model, the results showed that *A. precatorius* has the ability to speed up the healing of wounds. There were various possible direct or indirect results of the ethanolic extract administered as an ointment, as seen by the considerable reduction in both the epithelization duration and wound contraction time.[22]

#### Hepatoprotective activity

In 2009, Battu GR, Kumar BM investigated oral administration of *Abrus precatorius* hydroalcoholic extract (100 and 200 mg/kg) was given to animal exhibiting hepatotoxicity produced by 3 g/kg of paracetamol. A reference standard of 25 mg/kg of silymarin was administered. Every test medication was taken orally. The extract was identified to have hepatoprotective effect since serum levels of bilirubin, AST, ALT, and ALP were significantly reduced.[23]

#### Anti-malarial activity

In 2004, Limmatvapirat C evaluated that isoflavoquinone and abruquinone were extracted from the extract of the *Abrus* plant's extant sections and demonstrated anti-malarial activity. A similar sort of extract's cytotoxicity and antiplasmodial activity were also evaluated in addition to its antimalarial efficacy. The *A. precatorius* extract showed an IC 50 value less than 20 g/ml74,

demonstrating its extreme potency in suppressing some biological entities, including bacteria [24].

### Toxicity

Abrin (Toxalbumin) inhibits protein synthesis, causing cell death. This compound is found in immature seeds, making them extremely toxic.

There have been reports of poisoning incidents resulting from a finger prick sustained when stringing the seed. It may take a short hours to many days after consumption for symptoms to appear. There will be mydriasis, shaking, cold sweats, weakness in the muscle. No recognized physiological counteragent exists. In order to lessen the severity of gastrointestinal harm caused by *A. precatorius* poisoning, bismuth trisilicate may be administered. If bleeding happens, a blood transfusion can be required. [25, 26]

### CONCLUSION:

Regarding the pharmacological application of this species, the information given above is supported by the literature currently available. *Abrus precatorius* is a unique and adaptable plant with a range of pharmacological activities, including antidiabetic, neuroprotective, antibacterial, analgesic, and others.

**CONFLICT OF INTEREST:** The authors affirm that there isn't any conflict of interest with this article's publishing.

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