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## **Review Article on Pharmaceutical, Pharmacological Activities and Therapeutic Potential of "Abrus Precatorius"**

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**Abstract:** Abrus precatorius is considered beneficial for the hairs and the seeds extract is used in the treatment of ulcer and skin infection. It is seen that Abrus precatorius is very important plant for its large number of medicinal properties which includes antidiabetic, nephroprotective, neuroprotective, anal-gesic and many more.

**Keywords:** Antioxidant activity, Neuromuscular effects, Antimicrobial activity, Immunomodulating activity, Bronchodilator activity and Antidiabetic activity.

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### **Introduction**

Abrus precatorius is considered beneficial for the hairs and the seeds extract is used in the treatment of ulcer and skin infection [1]. In traditional & folklore medicine the plant is reported to possess beneficial effects in snake bite, in avabahuk, erysipelas and for promoting growth of ear lobes [2]. Medicinal plants are so important for health care of human beings in respect to ancient medicine system. Most of the traditional medicines are based on herbs, which are used by almost 80% of the world populations [3]. A. Precatorius Linn. Has been used in Hindu medicines from very early times, as well as China and other ancient cultures and Medicinal plants are part and parcel of human society to combat diseases, from the dawn of civilization [4,5]. Natural antioxidant present in food and other biological materials have attracted considerable interest because of their presumed safety and potential nutritional and therapeutic effects [6]. In Ayurveda roots and seeds of Abrus precatorius L. are used for the treatment of cervical adenitis, dental caries, baldness, defect of vision and to remove dandruff [7]. The genus Abrus Adans, consists of ca 17 species found in Africa, Madagascar, India and Indo-China [8]. Medicinal plants can be important source of previously unknown chemical substances with potential therapeutic effects. The medicinal use of plants is an ancient tradition, far older than the contemporary sciences of medicine, pharmacology and chemistry. The world health organization has estimated that over 75% of the world's population still relies on plant derived medicines, usually obtained from traditional healers, for its basic health care needs [9].

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### **Plant Profile:**

Plant taxonomy

Kingdom - Plantae

Division - Magnoliophyta

Order - Fabales

Family - Fabaceae

Subfamily - Faboideae

Tribe - Abreae

Genus - Abrus

Species - Abrus precatorius [10]

**Common names:**

English - Jequirity

Gujarati - Gumchi

Hindi - Gunchi, Gunja

Marathi - Gunja

Punjab - Mulati

Sanskrit - Gunja

Telugu - Guruginia

Urdu - Abrus precatorius [11]

**Common name according to different countries:**

Egypt - Rosary pea

Nepal - Crab's eye

Philippines - Jequerity

USA - Precatory bean

Indonesia - Saga

Pakistan - Gunchi

Nepal - Rati gedi

Indonesia - Weglis [12]

Figure 1: *Abrus precatorius*


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### Botanical description:

It is a beautiful, much – branched, slender, perennial, deciduous, woody, prickly twining or climbing herb. Stem cylindrical, wrinkled, bark smooth-textured, brown. Leaves stipulate, pinnately compound; leaflets 7- 24 pairs, 0.6-2.5 × 0.4-1.2 cm, turgid, oblong, obtuse, truncate at both ends, appressed hairy [13]. *Abrus precatorius* is a twining herb with delicate feathery leaves, climbing shrub, with greenish yellow branches. Leaves 5 – 17 compounds, leaflets obovate or oblong; Flowers are crowded racemes, sub sessile, pale purple to yellowish growing at the end of stalk [14]. Plant is creeper with branches. Leaves resemble tamarind leaves having 20 – 40 leaflets. Flowers are pink, bluish and appear in cluster. Legumes are 1.5 – 3.5 cm long containing red, white and black colored seeds. Red colored seeds have black spot on their tips. Roots and leaves are sweet like that of *G. Glabra* [15]. It is native to India, at altitudes up to 1200 m on the outer Himalayas. It is now naturalized in all countries [16]. [Shown in figure- 1]

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### Habitat:

In India, it is found all throughout the plains from Himalaya down to Southern India and Ceylon [17]. It is used medically in China, Indo china, Islands, West Indies, Guinea, Brazil, Sudan, South Africa, Madagascar and India [18].

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### Chemical constituents:

*Abrus* is rich in various chemical constituents such as abrol, abrasine, precol and precasine from the roots. Seeds are rich in several essential amino acids like serine, alanine, valine, choline and methyl ester [19]. Seeds are poisonous and contain principle. compound Abrine, Abaline, Abrasin, Abricin, Abrin, Abrusgenic- acid, Abrusgenic-acid-methyl-ester, Abruslactone, Abrussic-acid, Anthocyanins, Calcium, Campesterol, Chlorine, Cycloartenol, Delphinidin, Gallic-acid, Glycyrrhizin, Hypaphorine, N, N- dimethyl-tryptophan, N, N-dimethyl- tryptophan-metho-cation-methyl-ester, P-coumaroylgalloyl glucodelphinidin, Pectin, Pentosans, Phosphorus, Delphinidin, Gallic-acid, Glycyrrhizin, Hypaphorine, N,N-dimethyl-tryptophan, N,N-dimethyl-tryptophan-metho-cation-methyl-ester, P-coumaroylgalloyl-lucodelphinidin, Pectin, Pentosans, Phosphorus, Picatorine, Polygalacturonic-acids, Precasine, Precatorine, Campestanol and Protein Trigonelline [20]. [Shown in figure- 2]

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### Ethno botanical uses:

The plant is used in some traditional medicine to treat scratches and sores and wounds caused by dogs, cats and mice, and are also used with other ingredients to treat leucoderma [21]. Dry seeds of *Abrus precatorius* are powdered and taken one teaspoon once a day for two days to cure worm infection [22]. Root is chewed as a snakebite remedy [23]. Leaves are used as a substitute for liquorice (mulethi) [24]. However, for using as an anti-malarial and anti-convulsant the extract of fresh root in hot water can be administered orally [25]. Hotwater extract of seeds is taken orally for malaria [26]. *Abrus* seeds are also taken for tuberculosis and painful swelling [27]. They are considered abortifacient. Dried seeds are taken orally as an aphrodisiac [28,29]. The leaves are used for their anti-supportive properties. The plant contains glycyrrhizin as an anti phyto constituents [30]. *Abrus precatorius* is also used as an abortifacient, laxative, sedative and aphrodisiac [31]. The roots are used for gonorrhoea, Jaundice and haemoglobinuric bile [32].

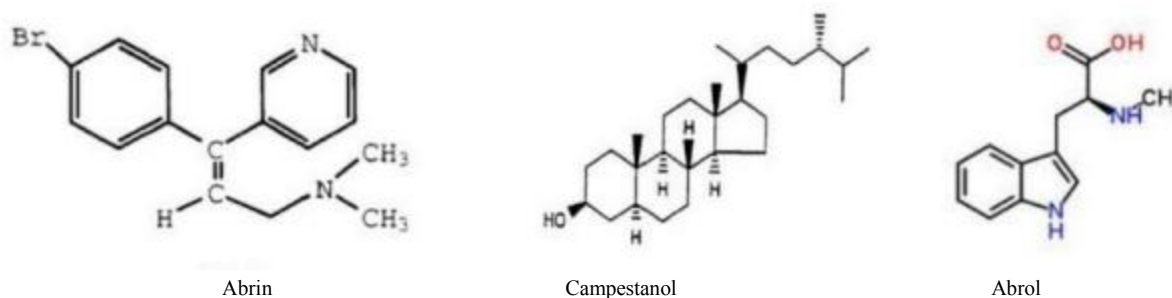


Figure 2: Some chemical compounds for which *Abrus precatorius* disclaim the medicinal effects.

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#### Pharmacological activity:

It is a medicinal herb whose leaves, roots and seeds are used for various purposes. Gunja is one such drug that undergoes the process of *sodhana* prior to its use as a medicine in *ayurveda* [33].

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#### Anti-diabetic activity:

The anti-diabetic effect of chloroform – methanol extract of *Abrus precatorius* seed, was studied in alloxan diabetic rabbits. The effect was compared to that of chlorpropamide – a known anti-diabetic drug in the class of sulphonylurea and a control group that received normal saline instead of the extract. When 50 mg / kg body weight of chloroform – methanol, chlorpropamide and 5 ml of normal saline for control were given orally, blood glucose levels decreased in chloroform – methanol and chlorpropamide groups of alloxan diabetic rabbits but not in control. This study therefore has shown that the chloroform – methanol extract of *Abrus precatorius* seed has some anti-diabetic properties similar to that of chlorpropamide [34].

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#### Anti-oxidant activity:

Ethanol extract of *Abrus precatorius* seeds was evaluated for potential antioxidant activity. Antioxidant activities were checked by using tests such as hydrogen peroxide-scavenging activity, hydroxyl radical-scavenging activity, reducing power activity etc. Results showed that in all the above said tests seed extract has antioxidant activity. Antioxidant activity was correlated with presence of total phenolic compound as gallic acid and total flavonoids as rutin in seed powder of *Abrus precatorius* [35].

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#### Anti-convulsant activity:

Anti-convulsant activity of *Abrus precatorius* L. was studied in different experimental models of convulsion. Results showed ethanol (70%) extract of fresh root of *Abrus precatorius* L. has anticonvulsant activity against metrazole induced convulsions but inactive against strychnine-induced convulsions when administered intraperitoneally to mice [36].

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#### Neuromuscular effects:

Some neuromuscular effects of the crude extracts of the leaves of *Abrus precatorius* were investigated using isolated toad rectus abdominis and rat phrenic nerve-diaphragm muscle preparations as well as young chicks. The ethanol extract of the leaves inhibited acetylcholine-induced contractions of the both toad rectus abdominis and rat phrenic nerve-diaphragm muscle preparations. The effects were concentration-dependent and reversible. The extract also caused flaccid paralysis when injected intravenously into young chicks. The ethanol extract had no effect on direct electrical stimulation of rat diaphragm. The inhibitory effect of the ethanol extract on the rat phrenic nerve-diaphragm preparation was potentiated in the presence of reduced calcium ions, elevated magnesium ions, or reduced potassium ions. Thus, the ethanol extract showed a similarity to d-tubocurarine in respect of the pattern of neuromuscular blockade. Both the petroleum ether and the water (cold and hot) extracts had no observable effects on the skeletal muscles used in the project. Apparently, the poisonous neuronal component of the leaves of *Abrus precatorius* resides mainly in the ethanol extract [37].

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#### Memory enhancer activity:

*Abrus precatorius* has been studied in Alzheimer's disease model by identification of glycohistochemically the microglial cells (MGC) activation in autaptic brain samples. *Abrus precatorius* agglutinin recognizes MGC in the cerebral white matter showed rod-like cells and appear to be particularly dense in those areas proximal to an oligodendroglial cell. Active constituent lectin from *Abrus precatorius* plant has been used to histochemically identify the microglial cells activation in autaptic brain samples from Alzheimer's disease subject [38].

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**Neuromuscular blocking activity:**

Ethanol (95%) extract of dried leaves of *Abrus precatorius* were administered at a concentration of 0.5 ml and it showed blocking action on phrenic nerve- diaphragm [39].

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**Nephroprotective activity:**

It is known that alcohol intake could induce severe renal injury as evident by derangement of serum electrolyte, elevation of creatinine levels and structural alterations of tubules, glomeruli etc. Elevation of malondialdehyde level indicates that the damage is related to increased lipid peroxidation [40].

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**Antimicrobial activity:**

Antimicrobial activity of divergent parts of *Abrus precatorius* like roots leaves and seeds were studied against some of the microorganisms. Root extract of *Abrus precatorius* against the Gram positive organism *Staphylococcus aureus* was found to be active. Root extracts possess good antibacterial potential particularly against *Staphylococcus aureus*. An antimicrobial activity of *Abrus precatorius* seed extract was assayed by in vitro studies in agar well diffusion method against ten bacterial species. Methanol extract exhibited antibacterial activity towards almost all the bacterial microorganisms [41].

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**Anti-inflammatory activity:**

The anti-inflammatory activity of *Abrus precatorius* extract was investigated on inflammation induced by croton oil on rat ear model. Extract of *Abrus precatorius* when co applied with croton oil to the rat ear produced a reduction in the inflammatory response were observed after 6 hours compared with croton oil alone. The extract produced 2% reduction of the inflammatory response in croton oil alone group. This finding explains the usefulness of the leaves of this plant in the treatment of inflammatory disease conditions by the traditional healers [42].

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**Anti arthritic activity:**

The anti arthritic activity was studied on croton oil induced inflammation rat model. Two different concentration (200 and 400 mg/kg) of water extract of leaves of *Abrus precatorius* were administered orally and both the extracts showed reduction in paw inflammation [43].

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**Anti-cancer activity:**

Anti-cancer activity of petroleum ether extract of *A. precatorius* L. was tested on Ehrlich Ascitis Carcinoma (EAC) in mice. 5-fluoro uracil was used as standard anti-cancer drug. Results showed that mean survival time of the animal under Ehrlich Ascitis Carcinoma was significantly increased by the petroleum ether extract of *A. precatorius* L. and was comparable to that of 5-fluoro uracil group. Treatment with petroleum ether extract of *A. precatorius* L. also increased the hemoglobin content as well as RBC count and reduce the WBC count towards normal level in EAC bearing mice. The investigators, therefore claimed that petroleum ether extract of *A. precatorius* L. has potential anticancer activity [44].

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**Tumor inhibiting activity:**

There is another finding reported about water extract of fresh seeds at a concentration of 2.0 microliters was inactive against mitogenic activity on human lymphocytes [45].

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**Immunomodulating activity:**

The immunomodulating activity was done by various researchers and one of the activities reported the effect of abrin on the cellular immune responses in normal and tumor-bearing animals. Natural killer cell activity was enhanced significantly by abrin in both the normal and the tumor-bearing group, and it was found to be earlier than the control. Antibody dependent cellular and complement mediated cytotoxicity was also enhanced in the abrin treated tumor-bearing group on the ninth day as well as 15 day which confirmed the immunomodulatory property of abrin [46].

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**Anti-fertility activity:**

Seeds extract could lower cauda epididymal sperm motility in rats and could reduce testicular weight, sperm count etc. Investigator observed that ethanol extract of seeds when administered intragastrically to male rats at a dose of 100.0 mg/kg for 60 days significantly decreased the number of pregnant female [47].

**Anti malarial activity:**

An isoflavanquinone, abruquinone, was isolated from the extract of aerial parts and exhibited antimalarial activity [48].

**Immunostimulatory effects:**

Abrin B derived from seeds of *A. precatorius* causes a strong agglutination of cells. This agglutination increases according to the order of differentiation in cells. A non toxic dose of abrin (1,25 µgram/kg body weight) can potentiate an immunresponse of a host, like increase in total leucocytes, weights of thymus and spleen [49].

**Anti serotonergic activity:**

Effect of ethyl acetate extract of *A. precatorius* L. leaves was tested on frog fundus strip using sumatriptan as a standard. Graded dose response of the extract on frog fundus strip was noted. This response suggested that the ethyl acetate of *A. precatorius* L. leaves possesses antiserotogenic activity [50].

**Bronchodilator activity:**

The methanol extract of the leaves of *Abrus precatorius* was evaluated for possible bronchodilator activity by using various in vivo and vitro models in guinea pigs [51].

**Conclusion:**

Numerous drugs have entered the international market through exploration of ethnopharmacology and traditional medicine. Although herbal medicines have also been used for thousands of years. The above collection information regarding the pharmacognostical and pharmacological use of this plant is verified with available literature. It is seen that *Abrus precatorius* is very important plant for its large number of medicinal properties which includes antidiabetic, nephroprotective, neuroprotective, analgesic and many more. Thus *Abrus precatorius* is quite promising as a multipurpose medicinal agent and addition to this, the future prospects for preclinical study on small animals will be screening out in some disorders like obesity, viral, Parkinsonism and thyroid. Clinical trials should be performed to prove its efficacy in larger population.

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