

**A Review on Phytochemical and Pharmacological Study of Herbal Medicinal Plant:
*Abrus precatorious***

Dafar S.P.,* Bhelke M.R., Nashine A.M., Dafar D.P., Rathod S.S.

Nagpur College of Pharmacy, Wanadongri, Nagpur, Maharashtra, 441110, India

Email: samikshadafar123@gmail.com

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ABSTRACT

Herbal plants are those whose aromatic, medicinal, or nutritional qualities are highly valued. They have been utilized for innumerable years in conventional medicine and continue to be utilized as a natural alternative to conventional medicine. An extensive variety of herbal plants exist, each possessing distinct advantages. It is imperative to acknowledge that although herbal plants are generally regarded as secure, they may cause adverse effects or interactions with specific medications in some individuals. Be sure to seek the advice of a healthcare professional prior to utilizing herbal remedies. *Abrus precatorious*, possesses pharmacological properties that make it a promising candidate for the development of novel drugs, according to scientific research. Studies have shown, for instance, that extracts derived from the plant possess antibacterial, antitumor, and antidiabetic properties. A prevalent constituent of numerous tropical and subtropical ecosystems, especially in regions characterized by disturbed or degraded soils, is *Abrus precatorius*. It thrives in moist tropical forests and arid scrublands alike, and is renowned for its prolific development and ability to displace indigenous species. *Abrus precatorius* is therefore classified as an invasive species in numerous countries, such as Australia, Hawaii, and Florida. Nevertheless, due to its propensity for misuse, elevated toxicity, and invasive characteristics, this plant necessitates cautious handling and management. Pharmacological activities, chemical constituents, phytochemical analysis, and analytical techniques were the primary focuses of the present study.

Keywords: *Abrus precatorious*, Phytochemistry, Herbal Medicine, Antitumor, Antidiabetic.

INTRODUCTION

Herbal medicines are natural remedies made from plants, herbs, roots, and other plant-based substances. They have been used for thousands of years to treat various ailments and promote general well-being. Herbal medicines are often used as an alternative or complementary therapy to conventional medicine. There are many different types of herbal medicines, and each one has its own unique properties and uses. *Abrus precatorius*, also known as the rosary pea, jequirity pea, or crab's eye. It is a woody climber that can grow up to 20 meters in height and produces distinctive red and black seeds with a hard, shiny coat. The plant also has some cultural significance, particularly in

Hindu mythology, where the seeds are associated with the god Vishnu and are used in various rituals and ceremonies. *Abrus precatorius* is a fascinating plant with both practical and cultural importance, but it should be handled with caution due to its toxic nature. The seeds of in India, for example, the seeds have been used to treat a range of conditions, including cough, diarrhoea, and skin disorders. Additionally, the plant is utilized in conventional Ayurvedic medication to cure a wide range of illnesses. The plant is known for its ornamental value and is often grown as a decorative plant in gardens and parks.^[1-4]

Taxonomical Classification:

- Kingdom- Plantae

* Corresponding author: Samiksha Dafar

E-mail address: samikshadafar123@gmail.com

- Subdivision- Tracheobionta (vascular plant)
- Superdivision- Spermatophyta (seed plant)
- Division- Magnoliophyta (flowering plant)
- Class- Magnoliopsida (dicotyledons)
- Subclass- Rosidae
- Order- Fabales
- Family- Faboideae
- Tribe- Abreare
- Subtribe- Abrinae
- Genus- Abrus L.
- Species- *Abrus precatorius*

Varieties of species-

- *Abrus precatorius* var. africanus
- *Abrus precatorius* var. precatorius

The varieties are subspecies of *Abrus precatorius* that have different geographic distribution and morphological characteristics.^[5-6]



Figure 1: *Abrus precatorius* plant, Rosary pea

Plant Description

In addition to its medicinal and decorative uses, has a long history of use in traditional folk remedies for a variety of ailments, for instance, snake bites, dysentery, and fever have all been treated with the roots, while the leaves have been used to treat skin diseases and rheumatism. The plant is also of interest to scientists because of its potential as a source of bioactive compounds. Studies have shown that the seeds contain a variety of compounds with potential pharmacological properties, including anti-inflammatory, anti-

cancer, and anti-microbial activity. Despite its toxic properties, *Abrus precatorius* is sometimes used in traditional religious practices. The seeds are sometimes used as a substitute for rosary beads, hence the common name "rosary pea", and are also used in some forms of Vodou and Santeria. However, it is important to note that handling the seeds can be dangerous and even fatal, and precautions should be taken to avoid accidental ingestion or inhalation. *Abrus precatorius* has also been used historically as a source of natural dyes.^[7-9] The seeds contain a red pigment called abrusgenic acid, which has been used to dye textiles and other materials. In some parts of the world, *Abrus precatorius* is considered an invasive species, as it can spread rapidly and displace native vegetation. In the United States, it is listed as a noxious weed in several states, including Florida and Hawaii. Despite its potential dangers and invasive tendencies, *Abrus precatorius* remains a plant of significant cultural and historical importance. Its striking appearance and diverse uses have made it a subject of fascination for scientists, artists, and traditional healers alike. However, caution should always be exercised when handling the seeds, and any use of the plant for medicinal or other purposes should be done under the guidance of a qualified expert. *Abrus precatorius* is a woody twining plant with distinctively poisonous red seeds and a black-marked base. It grows naturally in India at elevations of up to 1200 meters on the outer Himalayan range.^[10]

Other names of *Abrus precatorius* are

- Jequirity
- Crab's eye
- Rosary pea
- Red-bead vine
- Gundumani / Kundumani (in Tamil/India)
- Paternoster pea, love pea, precatory pea, or bean
- Jamaica wild Olinda (in Sri Lanka)
- Indian licorice, wild licorice, country licorice
- Akar saga

- Jumbie bead
- Ratti/rettee/retty
- Gunja/goonjaa/ goonja/gunjaa
- Coondrimany
- Gidee gidee

Chemical Constituents^[11-15]

The leaf of the *Abrus precatorius* plant contains a variety of chemical constituents, including

Abrin: The plant's seeds and leaves contain this harmful nutrient molecule. It can cause severe illness and even death if ingested.

Alkaloids: The leaves contain a variety of alkaloids, including abrine, hypaphorine, and precatorine. It has been demonstrated that these substances possess analgesic, anti-inflammatory, and anti-cancer properties.

Flavonoids: The leaves also contain flavonoids, which are plant pigments that have antioxidant and anti-inflammatory properties. Some of the flavonoids found in the leaves of *Abrus precatorius* include kaempferol and quercetin.

Triterpenoids: The leaves contain triterpenoids, which substances have demonstrated anti-inflammatory and anti-cancer properties.

Saponins: The leaves also contain saponins, which substances have been demonstrated to

possess anti-inflammatory, anti-cancer, and immune-stimulating properties.

Sterols: The leaves contain a variety of sterols, including stigmasterol and β -sitosterol. It has been demonstrated that these substances possess anti-inflammatory and anti-cancer properties.

Phenolic compounds: The leaves contain various phenolic compounds, including tannins, which have antioxidant, anti-inflammatory, and anti-cancer properties.

Carbohydrates: The leaves contain various carbohydrates, including glucose, fructose, and sucrose.

Proteins and amino acids: In addition to the toxic protein abrin, the leaves also contain non-toxic proteins and amino acids.

Minerals: The leaves contain various minerals such as calcium, magnesium, potassium, and iron.

Vitamins: The leaves contain vitamins like vitamin C and vitamin A.

Essential oils: The leaves of *Abrus precatorius* also contain essential oils, which have been shown to have antimicrobial and antioxidant properties.

Fatty acids: The leaves contain various fatty acids, including linoleic acid and oleic acid.

Glycosides: The leaves also contain glycosides, which are compounds that have been shown to have antifungal and antibacterial properties.

Resins: The leaves contain resins, which have been used in traditional medicine for their antimicrobial and anti-inflammatory properties.

The roots of the *Abrus precatorius* plant contain a variety of chemical constituents, including:

Abrine: a poisonous protein that is also present in plant seeds.

Alkaloids: including precatorine, hypaphorine, and trigonelline, have been reported to possess various pharmacological activities.

Flavonoids: including kaempferol and quercetin, which have antioxidant and anti-inflammatory properties.

Tannins: which have been reported to possess anti-diarrheal and wound healing activities.

Saponins: which have reportedly been found to have a range of pharmacological effects, such as anti-inflammatory and anti-cancer properties.

Glycosides: which are said to have hypoglycaemic and anti-inflammatory properties.

Steroids: which are said to have analgesic and anti-inflammatory properties.

Phenolic compounds: including ellagic acid and gallic acid, which have antioxidant and anti-inflammatory properties.

Fatty acids: including linoleic acid and oleic acid, have been reported to possess emollient and moisturizing properties.

The root extract has been reported to possess anti-ulcer activity, which has been attributed to the presence of flavonoids and tannins. The presence of alkaloids in the root extract has been suggested to contribute to its potential as a natural analgesic agent. The root extract has also been reported to possess anti-inflammatory activity, which has been attributed to the presence of phenolic compounds and saponins. The root extract has been found to exhibit significant antimicrobial activity against various pathogenic bacteria and fungi, which has been attributed to the presence of tannins and saponins. The presence of glycosides in the root extract has been suggested to contribute to its potential as a natural cardiogenic agent. The root extract has been found to possess significant hepatoprotective activity, which has been attributed to the presence of flavonoids and phenolic compounds. The presence of sterols in the root extract has been suggested to contribute to its potential as a natural cholesterol-lowering agent. The presence of alkaloids in the root extract has been suggested to contribute to its potential as a natural anti-cancer agent.^[16-20]

The seeds of the *Abrus precatorious* plant contain a variety of chemical constituents, including:

Abrin: a highly toxic protein that is similar in structure and function to ricin.

Abrusgenic acid: a triterpenoid saponin that has been reported to have antitumor, anti-inflammatory, and antimicrobial properties.

Abrus lactone A - a lactone compound that has been shown to have cytotoxic activity against cancer cells.

Beta-sitosterol - a phytosterol that has been reported to have cholesterol-lowering properties and potential anti-inflammatory effects.

Abrusosides A and B - two triterpenoid saponins that have been isolated from the seeds and reported to have cytotoxic activity against cancer cells.

Abrusgenic acid methyl ester - a derivative of abrusgenic acid that has been reported to have antitumor activity.

Quercetin - a flavonoid that has antioxidant and anti-inflammatory properties. Kaempferol - another flavonoid with antioxidant and anti-inflammatory properties. Gallic acid - a phenolic acid with antioxidant and anti-inflammatory effects

Tannins-polyphenolic compounds have been reported to have antimicrobial, antioxidant, and anticancer properties.

Steroids - compounds that have a wide range of biological effects, such as anti-inflammatory and anti-tumor effects.

Alkaloids - compounds that have been reported to have various pharmacological properties, including analgesic, antispasmodic, and antimicrobial effects.

Pharmacological Activity^[21-25]

Anti-fertility effect

On field trips and from herbal shops, whole plant specimens with dried seeds were purchased. The plant material was verified as authentic by comparison with specimens in the Quaid-i-Azam University Herbarium in Islamabad, Pakistan. The cold extraction technique was used to create an ethanolic seed extract. A disk mill model FFC-15 electrical grinder was used to grind the seeds into a coarse powder. 500 grams of seed powder were filtered after one week of soaking in 99.9% ethanol in a conical flask. This filtrate was dried at room temperature after being dried under reduced pressure in a rotary vacuum evaporator. The dried mass was removed from the flask's bottom and kept at 4°C for storage. 0.6% of the raw material was the yield of the extract. Two distinct doses of 20 and 60 mg/kg/BW were managed to produce from the stock solution by combining 3 g of the extract with 1000 ml of physiological saline.

They used adult male albino BALB/c mice that were between 30 and 35 days old (n = 48). For two weeks, they were kept in steel cages at a primate facility with a standard laboratory diet and unlimited access to water. After receiving approval from the institutional animal ethical committee, the

study was carried out. In order to create four groups of twelve male mice each, group I was designated as the control group. Groups II and III received intraperitoneal extract doses of 20 and 60 mg/kg over the course of 20 days, respectively. Half of the animals in each group received treatment for 20 days before being killed. The rest of the animals from each group were put to death after 20 days of treatment discontinuation. In order to examine daily sperm count and DNA damage, the testicles and epididymis of each animal were isolated and processed. The method described to determine testicular sperm production as well as daily sperm production (DSP). Following the removal of the testicles, the tunica albuginea was also removed and weighed.

Testis was homogenized for 20 minutes in 15 ml of homogenizing solution (0.05% Triton X-100, 0.01% sodium azide) using an electrical homogenizer. In order to dilute each 0.2 ml sample of homogenate, 0.8 ml of saline solution containing 1% trypan blue was added to a Horwell chamber to count spermatids. A microscope with 400x magnification was used to count the average number of spermatids in each sample aliquot of 10 l, which was then placed in the Horwell chamber. The total testicular spermatid count was calculated using this number, a dilution factor, and the original volume of homogenate. Spermatids per gram of testis were calculated by dividing this number by the weight of the decapsulated testis. During mouse spermatogenesis, developing spermatids spend roughly 4.84 days in steps 14 through 16. Thus, to calculate daily sperm production (DSP) and sperm production efficiency, respectively, the values for the number of spermatids per testis and per gram testis were divided by 4.84.^[26]

Anti-diabetic activity

With the aid of a semi-structured questionnaire, an ethnobotanical study of plants reputed to treat diabetes was carried out in five districts of Lagos State, Nigeria. The survey received responses from about 100 people, the majority of whom belonged to the Yoruba tribe. Most of them (76%) were male and had knowledge of the conventional treatment for diabetes. 96% of respondents reported

using mostly herbal remedies to treat their diabetes for 20 to 30 years or longer, which is unlikely to be the case with more traditional methods. They also developed a trustworthy, user-friendly diabetes diagnostic tool. The survey covered 50 multi-component herbal recipes, most of which were liquid preparations. These liquid medications were frequently taken orally without causing any harmful or toxic side effects (92%). The main anti-diabetic plants are *Blighia sapida*, *Alchornea cordifolia*, *Abrus precatorius*, and *Abrus precatorius* leaf. Diabetes can be managed with an infusion made by carefully squeezing the plant's leaves in water until the juice is released.^[27]

Antitumor activity

It has been demonstrated that a protein extract from the seeds of the plant *Abrus precatorius* has antitumor activity against the rats' solid and ascites-forming Yoshida sarcomas and mice's fibro sarcomas. Studies both in vivo and in vitro have demonstrated that the protein-treated ascites tumor cells undergo direct cytotoxicity from the extract, which results in vacuolation, cytoplasmic disturbance, followed by disintegration of the cell nucleus and genetic abnormalities. In another study, agglutinin protein purified extract from the seeds of *Abrus precatorius* was found to have strong anti-tumor properties. After giving mice 1ng of abrin B, abrin A inhibited the growth of tumors by about 90%. Abrins A and B may have a variety of binding sites that help to prevent mouse malignant tumors, according to studies on binding inhibition with sugars. *Abrus precatorius* seeds were used to make the hetero tetrameric specific lectin known as *Abrus agglutinin* (AAG). According to in vitro tests, AAG at a concentration of 1 gm/ml prevented the growth of Dalton's lymphoma ascites cells (DLAC), whereas AAG at a lower concentration of 1 ng/ml caused the production of peritoneal macrophages and NK cells from the spleen, which was later shown to be cytotoxic to DLAC.^[28-30]

Tumor inhibiting activity

Another finding was that the mitogenic activity on human lymphocytes could not be inhibited by fresh seed aqueous extracts at a concentration of

2.0 l/ml. Comparable results were obtained using methanol extract at 10 mg/ml on *Salmonella typhimurium* TM677 and ethanol (95%) dried stem extract at 30.0 mcg/ml against CA-9KB, ED50. Regarding the Yoshida ASC sarcoma and the CA-9KB cell culture strain, two additional extracts (water and methanol) from dried seeds show encouraging results. The testes of the *Poecilocera picta* were responsive to a water extract of the seeds. Abrin, an isolated substance from the seeds of *Abrus precatorius*, exhibited antitumor properties both in vitro and in vivo by inducing apoptosis. At IC₅₀ >1000mg/ml, virus-avian myeloblastosis was found to be negative.^[31]

Anti-microbial

Utilizing the agar well diffusion technique, the anti-microbial properties of *Abrus precatorius* extracts from the leaves, stem, and seed oil was tested against a number of microorganisms, including *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Enterococcus faecalis*, *Streptococcus anginosus*, *Bacillus subtilis*, *Corynebacterium* spp., *Escherichia*. All of the test bacteria were found to be inhibited by the aqueous extract of *A. precatorious*, but the fungal strain was unaffected. Extract from the root of *Abrus precatorius* also demonstrated antibacterial activity against the various kinds of tested bacteria. Thirteen gram-positive and gram-negative bacteria were inhibited by various solvent fractions or concentrations. The antibacterial activity was found to be restricted to particular chromatophores in the chloroform fraction using the bioautography assay. Nearly every component of the *Abrus precatorius* has antibacterial properties.^[32-34]

Anti-migraine activity

A migraine is a throbbing headache that is unilateral and accompanied by nausea and vomiting. Although the exact cause of migraines is still unknown, the most widely accepted explanation is that it is caused by a problem with the serotonergic system. Serotonin belongs to a specific class of neurotransmitters that controls emotions, sensory abilities, sex life, sleep, as well as the opening and closing of the vascular system. An additional feature of headaches is the

overactivity of a specific active protein, which causes inflammatory pain in a specific region of the brain. Women are three times more likely than men to have migraine attacks. According to Goads and colleagues, migraines are brought on by brain dysfunction, which activates and sensitizes the trigeminovascular system, especially the trigeminal nociceptive afferents innervating the "meninges" and causing headaches. The brain's serotonin levels play a role in the migraine-causing constriction and subsequent dilation of blood vessels. Triptans help to stop migraine attacks by activating serotonin receptors. *Abrus precatorius* anti-migraine properties were demonstrated using frog and male Wister albino rat fundus muscle preparations, both of which were rotated on a Sherrington rotating drum. Both muscle preparations were subjected to the muscle-contraction-inducing effects of crude *Abrus precatorious* extracts in petroleum ether and ethyl acetate.^[35-37]

Antimalarial

A. precatorious extract contained an isoflavanone compound that exhibited antimalarial activity. Then, cytotoxicity and anti-plasmodial activity were used to evaluate the antimalarial activity. While anti-plasmodial activity was assessed using micro-radioactive techniques, cytotoxicity activity was assessed in melanoma cells. The 96-plate heritage was used for the *A. precatorious* extract assay three times, in triplicate each time, principally in the circle phase and falciparum malaria of 0.5–1%. IC₅₀ values for the *A. precatorious* extract were less than 20 g/ml 53. *Abrus precatorius* extract tested positive for anti-plasmodial activity with an IC 50 value of less than 20 g/ml. The antimalarial activity of abruquinone, which was isolated from the extract of aerial parts, was discovered.^[38]

Broncholytic activity

An established immune response prototype of respiratory distress caused by an antigen is allergy bronchoconstriction. Histamine hypoxia when it is inhaled, which in turn leads to convulsions in the lab rats. In the cardiovascular system, it also results in capillary dilatation, acute anaemia, and

very intense seamless nerve and muscle. Histamine has a lot of notable consequences in lab rats, including severe bronchoconstriction, which causes hypoxia and death. These symptoms can be postponed with bronchodilators. Salbutamol, a well-known activator of the β 2-adrenergic receptor and vasodilator, is widely prescribed to treat vasoconstrictive illnesses including asthma. The findings suggest that the *Abrus precatorius* aqueous extracts may have a vasodilator effect, which is continuous with the plant's historical applications in the treatment of asthma. The findings support the plant's traditional uses in the treatment of asthma by indicating that the *Abrus precatorius* leaf extract may have bronchodilator activity. When the contractions brought on by histamine and/or acetylcholine are diminished or inhibited in the presence of the extract, it is therefore provocative of a number of anti or anticholinergic activities. The results suggest that the aqueous extracts of *Abrus precatorius* may have a beta blocker effect, which is consistent with the plant's historical applications in the treatment of asthma. When the contractions brought on by histamine and/or acetylcholine are diminished or inhibited in the presence of the extract, it is therefore provocative of powerful anti or anticholinergic activity. The leaves of *Abrus precatorius* have a broncho-dilator effect, and their methanolic extract has been used traditionally to treat asthma.^[39-42]

Anti-serotonergic activity

The anti-serotonergic effects of the ethanolic of *Abrus precatorius* leaf 66 were examined on a tadpole retina band while sumatriptan served as the standard of care. Additionally, this plant is used as an expectorant, febrifuge, haemostat, laxative, purgative, anodyne, aphrodisiac, antimicrobial antibacterial, diuretic, emetic, and expectorant. Vermifuge, sedative, and refrigerant. Studies showed that they were more likely to get migraine headaches. Additionally, erratic hormone levels suggest a link to migraines. When compared to allergy meds as a reference, revealed the presence, of Soxhlet extraction leaves *Abrus precatorius* with ethanol carbohydrates, enzymes, phenolics,

tannins, and essential nutrients in addition to anti-serotonergic action on a tadpole fundus strip.^[43-44]

Anti-allergic activity

Four abruquinones- A, B, D, and F showed strong anti-allergic effects. Rat mast cells and neutrophils at concentrations of less than 1 g/ml and 0.3 g/ml, respectively, inhibited superoxide synthesis. Both normal and adrenalectomized mice did not develop Polymyxin B-induced hind paw swelling thanks to abruquinone A. Additionally, these chemical elements more effectively inhibited plasma extravasation in ear edema brought on by histamine, serotonin, bradykinin, and substance P than did diphenhydramine and methysergide. The gums, mucilages, tannins, or phenols present in the seeds may be responsible for the early therapeutic properties of the bright red-coloured seeds as well as the methanol insoluble fractions of the white version. This shows how effective seed crude extract and proportions are at stopping the disease in living things. Fundus muscle preparations from albino rats and frogs were used in an in-vitro study to examine the anti-serotonergic activity. Petroleum ether extracts demonstrated smooth muscle contraction at various concentrations, and as the dose increased, the response also increased, whereas ethyl acetate extracts only demonstrated the baseline elevation when compared to Sumatriptan at various doses. An inactive ethanol/water extract of the aerial parts (500 mg/kg) was used to measure the body temperature.^[45-47]

Anti-arthritis activity

On a rat model of inflammation brought on by croton oil, the anti-arthritis activity was investigated. *Abrus precatorius* leaf water extract was given orally in two different concentrations (200 and 400 mg/kg), and both extracts reduced paw inflammation. The impacts of *Abrus precatorius* white (APW) and red (APR) seed extracts on Freund's complete adjuvant-induced joint pain (arthritis) in rats were the subject of a separate article.^[48-49]

Anti-inflammatory activity

In a rat ear model with inflammation caused by Croton oil, *Abrus precatorius* extract was tested

for anti-inflammatory effects. The inflammatory response in rats' ears was improved following the treatment of extracts of *Abrus precatorius* combined with croton oil for 6 hours. A 2% reduction in inflammation was observed in the group that received Croton oil alone. This discovery explains why traditional healers have used the leaves of this plant to treat inflammatory disease conditions. A second study was also reported using the same model based on isolated active substances, e.g., triterpenoids, saponins, and acetate derivatives. Acetates exhibited significant inhibitory action than the parent compounds at both 300 and 600g, though different test compounds reduced inflammation. At 600 µg concentration, the parent compound acetate derivatives were more efficient than all other test-treated groups.^[50]

Anti-spermatogenic effect

Male rats were given ethanol seed extract (100 mg/kg) intra gesturally for 60 days, but the results were insignificant. On the other hand, when rats were given an extract of dried seeds diluted in ethanol and water (1:1) at a dose of 250 mg/kg, the outcomes were significant. Nevertheless, the testicles and total sperm in either cauda epididymis showed no appreciable histological changes after 60 days. After being administered intramuscularly, the sterol fraction of dried seeds demonstrated excellent results. Additionally, seminiferous tubule diameter significantly decreased and testicular lesions characterized by the cessation of spermatogenesis were observed.^[51-53]

Immunomodulating activity

Abrin's impact on cellular immune responses in healthy and tumor-bearing animals was reported as one of the immunomodulating activities carried out by various researchers. Abrin substantially enhanced cell lysis and it was reported to be associated earlier than the comparison group in both the normal group (49.8% cell lysis on day 9) and the malignant cells group (51.7% cell lysis on day 9). On the ninth day 44% cell lysis and on 15 days 27.6% cell lysis, the tumor-bearing group treated with abrin showed higher antibody-dependent cellular and complement-mediated

cytotoxicity, continuing to support abrin's immunomodulatory properties. Another study examined the effects of Abrus agglutinin on murine splenocyte proliferation, cytokine secretion, NK cell activation, and thymocyte proliferation in under native (NA) and heat-denatured (HDA) conditions. Native agglutinin, HDA-induced stimulated media, and non-adherent splenocytes could all could enhance one another, as well as non-adherent splenocytes could do the same for adherent splenocytes. Heat-denatured agglutinin seemed to be able to induce NK cells at concentration range a far lesser than NA, but NA encouraged NK cells to a larger extent. There has also been evidence of thymocyte proliferation decided to bring on by NA and HDA. This study suggests that Abrus agglutinin, both in its original environment and after heating, may have immunomodulatory properties. In healthy mice, a – anti dose of abrin (1.25 mg/kg body weight) continuously injected over five days generated unique humoral reactions. Spleen, thymus, circulating antibodies, antibody-forming cells, myeloid cells cellularity, and alphas erase-positive all demonstrated an improvement. The findings imply that abrin has the potential to enhance the host's humoral immune response. AGP and ABP both have immunostimulatory effects in mice bearing DL, according to research on the in vitro immunostimulatory effect of peptide fractions derived from Abrus lectins.^[54-55]

Antioxidant and Anti-proliferative

Using in vitro tests, the leaf extract of *Abrus precatorius* can act as an antioxidant agent. This plant's extracts also contain a sizeable number of flavonoids, which have recently gained interest in medicine as bioactive agents. They have been credited with having a strong antioxidant activity that aids in preventing cells from oxidative damage brought on by free radicals because of their redox properties, which allow them to function as reducing agents, singlet oxygen quenchers, and hydrogen donors. The antiproliferative effects' cytotoxicity, percentage inhibition, and IC50 values were calculated. A declining IC50 value results in an increase in anti-proliferative activity. The *Abrus precatorius* leaf extracts (APA and

APE), which have no toxic effects on healthy cells, have been demonstrated to be potential antiproliferative agents in a study. The antioxidant and antiproliferative activities may be brought on by the synergistic interactions of bioactive substances. The plant has components in addition that could also be evaluated as potential antioxidant medications to help diseases caused by oxidative stress.^[55]

Nephroprotective activity

The nephroprotective efficacy of the stem of the *A. precatorius* plant was evaluated in order to identify the mechanism by which acetaminophen and cisplatin-induced nephrotoxicity reversed. It was investigated whether *A. precatorius* could heal HEK 293 cells damaged by cisplatin and acetaminophen utilizing MTS's mitochondrial activity experiment. Its results demonstrated also that the stem water extract from *A. precatorius* had the best recovery effects and might be utilized to prevent or cure kidney distraction.^[57]

Carcinogenic activity

The study discussed the prevention of hepatocellular carcinoma in Swiss albino rats by N-nitroso diethylamine (NDEA) and *Abrus precatorius* (Leguminosae) in HepG2 cells. *Abrus precatorius* aqueous/ethanol (50%) extract had a significant cytotoxic effect on HepG2 cells. From 6 to 12 hours, 100 g/ml significantly increased and maintained the expression of p53. The average and similar liver weights seem to have been significantly smaller at dosages of 100 and 200 mg/kg of AP extract than those in the control group. The treatment of sarcoma with intraperitoneal aqueous extracts extract (5mcg/kg) and subcutaneous protein fraction of seed extract (20mcg/kg), respectively, produced similar outcomes. In another study, Sarcoma 180 (ASC) in mice was treated with 100 mg/kg of ethanol extract of *Abrus precatorius*. The protein agglutinin, which precipitated from the seeds, had a strong antitumor effect.^[57]

Anti-depressant activity

The anti-depressant action was noticed after giving mice of both sexes various doses of ethanol (70%)

extract of the fresh root of *Abrus precatorius*. *Abrus precatorius* has been investigated as an Alzheimer's disease model by identifying the activation of microglial cells (MGC) using glycohisto chemistry in autaptic brain tissues. Rod-like cells seem to have been observable in the cerebral white matter, and those regions near oligodendroglia cells where MGC is recognized by the *Abrus precatorius* agglutinin appear to be particularly dense. The active substance lectin from the plant *Abrus precatorius* has been utilized to histochemically identify the activation of microglial cells in a model brain sample from Alzheimer's patients.^[57]

Immunostimulatory effects

Cells are vigorously agglutinated by the substance abrin B, which is derived from the seeds of *A. precatorius*. The degree of this agglutination changes in accordance with the order of cell differentiation. Abrin, which is non-toxic at doses of 1.25 grams per kilogram of body weight, can enhance the immune response of the host by causing an increase in total leucocytes, weights of the spleen, and thymus.^[57]

Toxic Effect

Abrus precatorius seeds contain both the poisonous dietary fibres abrin (ABR)A-D and the comparatively anti-agglutinin known as abris agglutinin (AGG). Agglutinin, a 134 kD heterotetrameric glycoprotein, and brin, a 63 kD heterodimeric glycoprotein, are two different types of glycoproteins. These two lectins, which are both members of the ribosome-inactivating proteins-II (RIP-II) family, are joined by a single disulfide bond to form a toxic subunit A chain (molecular weight 30 kD) and a galactose-binding B subunit (molecular weight 31 kD). Abrin permanently inhibits animal cell 60S-ribosome synthesis, immobilizing protein synthesis. Abrus agglutinin has a lower protein synthesis inhibitory concentration (IC₅₀=3.5 nM) than Abrin. Abrin-a, one among four isoabrin from the plant, has the highest inhibitory effect on protein synthesis. It is composed of an A chain with 250 amino acids and a B chain with 267 amino acids. Agglutinin-I and abrin have similar overall protein folding, but

Abrus agglutinin is less toxic than *abrin* because Asn200 in *abrin-A* has been replaced with Pro199 in *agglutinin*. Well-chewed *Abrus precatorius* seed consumption has been linked to fatal incidents. The hard seed coat allows it to pass through the digestive tract undigested and safely. Unripe seeds are more dangerous because their seed coats are brittle and easily broken. It has been suggested that a finger prick during seed stringing could result in poisoning. Symptoms may start to manifest just several hours to several days after ingestion. One of them is severe gastroenteritis with noticeable gastrointestinal disorders. Mydriasis will also appear, along with joint pain, rapid heart rate, night sweats, and trembling. There is no recognized biological countermeasure.^[54-57]

CONCLUSION

Herbal medicine is the use of plants (herbs) to treat disease and promote health. Some of the skin issues that are treated with herbal medicine include nervousness, joint problems, anxiety, hypertension, insomnia, hormonal problems, migraine headaches, dermatitis, and other disorders. Herbs need to be used carefully because they can have an impact administers herbs. The use of botanicals is deeply ingrained in medical practice, despite the fact that some people may dismiss herbal remedies as quack medicine. Ancient physicians created precise pharmacopeia to treat a range of illnesses by methodically compiling information about herbs. More than a quarter of synthetic drugs currently on the market today have active ingredients derived from plants that have been used as medicine for thousands of years. There are many medications that are available that are regarded as traditional medicines and have gained access to the international market through the study of ethnopharmacological activity. This review article demonstrates that *A. precatorius* is a singular source of many essential phytochemicals, making it very distinctive and adaptable for its broad variety of pharmaceutical properties, such as antihyperglycemic, neuro-protective, anti-microbial, pain reliever, and others. Due to the highly medicinal qualities of the plant material, they contain, thorough studies are now required. It is time to take advantage of *Abrus precatorius*

therapeutic potential to fight various diseases. The analysis of the literature cited above reveals that *Abrus precatorius* has a high potential for pharmacogenetic and pharmacological applications, making it a promising candidate for a multipurpose medicinal agent.

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REFERENCES

1. Khairullah AR, Solikhah TI, Ansori ANM, Hanisia RH, Puspitarani GA, Fadholly A, et al. Medicinal importance of *Kaempferia galanga* L. (Zingiberaceae): A comprehensive review. *J Herbmmed Pharmacol*. 2021; 10(3):281-8. <http://herbmmedpharmacol.com/Article/jhp-37998>
2. Das A, Jain V, Mishra A. A brief review on a traditional herb: *Abrus precatorius* (L.). *Int J Forensic Med Toxicol Sci*. 2016; 1(1):1-10
3. Janghel V, Patel P, Chandel SS. Plants used for the treatment of icterus (jaundice) in Central India: A review. *Ann Hepatol*. 2019; 18(5):658-72. <https://doi.org/10.1016/j.aohep.2019.05.003>
4. Kuo S-C, Chen S-C, Chen L-H, Wu J-B, Wang J-P, Teng C-M. Potent antiplatelet, antiinflammatory, and antiallergic isoflavanquinones from the roots of *Abrus precatorius*. *Planta Med*. 1995; 61(04):307-12.
5. Mølgaard P, Nielsen SB, Rasmussen DE, Drummond RB, Makaza N, Andreassen J. Anthelmintic screening of Zimbabwean plants traditionally [https://doi.org/10.1016/S0378-8741\(00\)00377-9](https://doi.org/10.1016/S0378-8741(00)00377-9)
6. Jouad H, Haloui M, Rhiauani H, El Hilaly J, Eddouks M. Ethnobotanical survey of medicinal plants used for the treatment of diabetes, cardiac and renal diseases in the North centre region of Morocco (Fez-Boulemane). *J Ethnopharmacol*. 2001; 77(2-

- 3):175-82. [https://doi.org/10.1016/S0378-8741\(01\)00289-6](https://doi.org/10.1016/S0378-8741(01)00289-6)
7. Lalithakumari H, Reddy V V, Rao GR, Sirsi M. Purification of Proteins from *Abrus precatorius* L. & Their Biological Properties. Indian J Biochem. 1971; 8(4):321-3.
 8. Tabasum S, Khare S, Jain K. Spectrophotometric quantification of total phenolic, flavonoid, and alkaloid contents of *Abrus precatorius* L. seeds. Asian J Pharm Clin Res. 2016; 9(2):3714.
 9. Solikhah TI, Solikhah GP. Effect of Muntingia calabura L. leaf extract on blood glucose levels and body weight of alloxaninduced diabetic mice. Pharmacogn J. 2021; 13(6):1450-5. <https://doi.org/10.5530/pj.2021.13.184>
 10. Prabha M, Perumal C, Kumar P, Soundarrajan, Srinivasan S SR. Review Article Pharmacological activities of *Abrus precatorius* (L.) seeds. Int J Pharm Med Res J homepage. 2015; 3(2):195- 200.
 11. Verma D, Tiwari SS, Srivastava S, Rawat AKS. Pharmacognostical evaluation and phytochemical standardization of *Abrus precatorius* L. seeds. Nat Prod Sci. 2011; 17(1):51-7.
 12. Polito L, Bortolotti M, Maiello S, Battelli MG, Bolognesi A. Plants producing ribosomeinactivating proteins in traditional medicine. Molecules. 2016; 21(11):1560. <https://doi.org/10.3390/molecules21111560>
 13. Elisabetsky E, Figueiredo W, Oliveria G. Traditional Amazonian nerve tonics as antidepressant agent: Chaunochiton kappleri: A case study. J Herbs Spices Med Plants. 1992; 1(1-2):125-62.
 14. Wambebe C, Amosun SL. Some neuromuscular effects of the crude extracts of the leaves of *Abrus precatorius*. J Ethnopharmacol. 1984; 11(1):49-58. [https://doi.org/10.1016/0378-8741\(84\)90095-3](https://doi.org/10.1016/0378-8741(84)90095-3)
 15. Ibrahim AM. Anthelmintic activity of some Sudanese medicinal plants. Phyther Res. 1992;6(3):155-7. <https://doi.org/10.1002/ptr.2650060312>
 16. Alhamdani M, Brown B NP. Abrin poisoning in an 18-month-old child. Am J Case Rep. 2015; 16:146-8. <https://doi.org/10.12659/AJCR.892917>
 17. Khairullah AR, Solikhah TI, Ansori ANM, Hidayatullah AR, Hartadi EB, Ramandinianto SC, et al. Review on the Pharmacological and Health Aspects of Apium Graveolens or Celery: An Update. Syst Rev Pharm. 2021; 12(1):606-12
 18. Okhale SE, EM N. *Abrus precatorius* Linn (Fabaceae): phytochemistry, ethnomedicinal uses, ethnopharmacology and pharmacological activities. Int J Pharm Sci Res. 2016; 1:37-43.
 19. Verma S. Phytochemical and pharmacological study on *Abrus precatorius*. Asian J Plant Sci Res. 2016; 6(2):24-6.
 20. Bhakta S, Awal A, Das SK. Herbal contraceptive effect of *Abrus precatorius*, *Ricinus communis*, and *Syzygium aromaticum* on anatomy of the testis of male Swiss albino mice. J Adv Biotechnol Exp Ther. 2019; 2(2):36-43. <https://doi.org/10.5455/jabet.2019.d23>
 21. Nath D, Sethi N, Singh RK, Jain AK. Commonly used Indian abortifacient plants with special reference to their teratologic effects in rats. J Ethnopharmacol. 1992; 36(2):147-54. [https://doi.org/10.1016/0378-8741\(92\)90015-J](https://doi.org/10.1016/0378-8741(92)90015-J)
 22. Tripathi S, Maiti TK. Immunomodulatory role of native and heat denatured agglutinin from *Abrus precatorius*. Int J Biochem Cell Biol. 2005; 37(2):451-62. <https://doi.org/10.1016/j.biocel.2004.07.015>
 23. Choudhari AB, Sayyed N, Khairnar AS. Evaluation of antiserotonergic activity of ethyl acetate extract of *Abrus precatorius* leaves. J Plant Res. 2011; 4(3):570-2
 24. Patil MM, Patil SV, Akki AS, Lakhkar B BS. An arrow poison (*Abrus precatorius*) causing fatal poisoning in a child. J Clin diagnostic

- Res JCDR. 2016; 10(3):SD03-4. <https://doi.org/10.7860/JCDR/2016/18234.7439>
25. Acharya D, Sancheti G, Shrivastava A. Medicinal plants for curing common ailments in India Positive Health. 2004; 102: 28-30.
 26. Adesina SK. Studies on some plants used as anticonvulsants in Amerindian and African traditional medicine. Fitoterapia 1982; 53:147–162.
 27. Chopra RN. Indigenous drugs of India their medical and economic aspects, the art press, Calcutta, India. 1933; 550.
 28. Premanand R & Ganesh T. Neuroprotective effects of *Abrus precatorius* Linn. Aerial extract on hypoxic neurotoxicity induced rats. Intern J Chem and Pharmac Sci. 2010; 1(1).
 29. Desai VB, M Sirsi. Antimicrobial activity of *Abrus precatorius*. Ind J Pharm. 1966; 28: 164.
 30. Panneerselvam K, SC lin, CL Liu, YC Liaw, JY Lin, TH Lu. Crystallization of agglutinin from the seeds of *Abrus precatorius*. Acta Crystallographic a Section D Biological Crystallography. 2000; 56(7): 898–899
 31. Desai VB, M Sirsi, M Shankarappa, AR Kasturibai. Studies on the toxicity of *Abrus precatorius* effect of aqueous extracts of seeds on mitosis and meiosis in grasshopper, (*Poecilocera picta*). Indian J Exp Biol. 1966; 4: 164.
 32. Bhaduri B, CR Ghose, AN Bose, BK Moza, UP Basu. Anti-fertility Activity of some medicinal Plants. Indian J Exp Biol. 1968; 6: 252-253
 33. Nath D, N Sethi, RK Singh, AK Jain. Commonly used Indian abortifacient plants with special reference to their teratologic effects in rats. J Ethnopharmacol 1992; 36(2): 147–154.
 34. Carbajal D, A Casaco, L Arruzazabala, R Gonzalez, V Fuentes. Pharmacological screening of plant decoctions commonly used in Cuban folk medicine. J Ethnopharmacol. 1991; 33(1/2): 21–24.
 35. Nwodo OFC, JH Botting. Uterotonic activity of extracts of the seeds of *Abrus precatorius*. Planta Med. 1983; 47(4): 230–233.
 36. Gogte VM. Ayurvedic Pharmacology and therapeutic uses of medicinal plants (Dravyagunavignyam). India: Bharatiya Vidya Bhavan; 2000, p. 600-601.
 37. Chang HM, Chiang TC, Mak TCW. Isolation and structure elucidation of abruslactone A: a new oleanene-type triterpene from the roots and vines of *Abrus precatorius* L. J Chem Soc Chem Commun 1982; (20): 1197-1198
 38. Choi YH, Kinghorn AD, Shi XB, Zhang H, Teo BK. Abrusoside A: a new type of highly sweet triterpene glycoside. J Chem Soc Chem Commun 1989; (13): 887-888.
 39. Kennelly EJ, Cai L, Kim NC, Kinghorn AD. Abrusoside e, a further sweet-tasting cycloartane glycoside from the leaves of *Abrus precatorius*. Phytochemistry 1996; 41(5): 1381-1383.
 40. Bhaumik HL. Hydrocarbons, fatty acids, triterpenoid and sterols in the seeds of *Abrus precatorius*. Sci Cult 1987; 53(1): 23-24.
 41. Anderson JD, Mandava N, Gunn CR. Plant growth inhibitor from *Abrus precatorius* seeds. Plant Physiol 1972; 49: 1024-1026.
 42. Krishnamoorthy V, Seshadri TR. Survey of anthocyanins from Indian sources: Part III. J Sci Ind Res 1962; 21: 591-593.
 43. Ae L, Bnrl J, Nf N. Protective effect of *Abrus precatorius* seed extract following alcohol induced renal damage. Eur J Sci Res 2009; 25(3): 428-436.
 44. Sudaroli M and Chatterjee TK. Evaluation of red and white seed extracts of *Abrus precatorius* Linn. against freund's complete adjuvant induced arthritis in rats. J Med Plants Res 2007; 1(4): 86- 94.
 45. Sinha R. Post-testicular antifertility effects of *Abrus precatorius* seed extract in albino rats. J Ethnopharmacol 1990; 28(2): 173-181.

46. Subbaiah MV, Yuvaraja G, Vijaya Y, Krishnaiah A. Equilibrium, kinetic and thermodynamic studies on biosorption of Cu (II), Cd (II), Pb(II) and Ni (II) from aqueous solution by chitosan *Abrus precatorius* blended beads. J Chem Pharm Res 2011; 3(2): 365-378.
47. Karpurashetti NB, Hiremath SK, Manjulabai KH KS. A review of gunja (*Abrus precatorius* Linn) on both aspect of medicine as well as poison. Asian J Pharm Res Dev. 2014; 2(1):66-7.
48. Alhamdani M, Brown B NP. Abrin poisoning in an 18-month-old child. Am J Case Rep. 2015; 16:146-8. <https://doi.org/10.12659/AJCR.892917>
49. Saganuwan SA, Onyeyili PA. Biochemical effects of aqueous leaf extract of *Abrus precatorius* (Jecquirity bean) in Swiss albino mice. Herba Rolonica, 2010; 56(3): 63-80.
50. Atuboyedia WO, Jonah SA, Chinagoro TOE. Antifertility effects of aqueous extract of *Ocimum gratissimum* L. leaves in male mice. Journal of Medicinal plants Research, 2010; 4(9): 809-816.
51. Bhakta S, Awal A, Das SK. Herbal contraceptive effect of *Abrus precatorius*, *Ricinus communis*, and *Syzygium aromaticum* on anatomy of the testis of male Swiss albino mice. J Adv Biotechnol Exp Ther., 2019; 2(2): 36-43.
52. Bhatt N, Chawla SL, Rao MV 2007. Contraceptive evaluation of seed extract of *Abrus*. Journal of herbal medicine and toxicology, 2001; 1(1): 47-50.
53. Sinha R. Post-testicular antifertility effects of *Abrus precatorius* seed extract in albino rats. Journal of Ethnopharmacology, 1990; 28(2): 173-81. 3
54. Rao MV. Antifertility effects of alcoholic seed extract of *Abrus precatorius* Linn. in male albino rats. Acta Europaea Fertilitica, 1987; 8(3): 217-20.
55. Sinha S, Mathur RS. Effect of steroidal fraction of seeds of *Abrus precatorius* Linn. on rat testis. Indian Journal Experimental Biology, 1990; 28(8): 752-6.
56. Jahan S, Rasool S, Khan MA, Ahmad M, Zafar M, Arsahd M, Abbasi AM. Antifertility effect of ethanolic seed extract of *Abrus precatorius* L on sperm production and DNA integrity in adult male mice. Journal of Medical Plants Research, 2009; 3(10): 809-814
57. Ojewole JA. Laboratory evaluation of the hypoglycemic effect of *Anacardium occidentale* Linn (Anacardiaceae) stem-bark extracts in rats, Experimental Clinical Pharmacol, 2003; 25: 199–204