WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 13, Issue 1, 1020-1033. Research Article ISSN 2277–7105

MEDICINAL IMPORTANCE OF *ABRUS PRECATORIUS* LINN. IN AYURVEDA

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Article Received on
21 November 2023,

Revised on 11 Dec. 2023,
Accepted on 31 Dec. 2023

DOI: 10.20959/wjpr20241-29602

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ABSTRACT

Medicinal plants are being widely used, either as a single drug or in combination with other treatments.*Abrus precatorius* Linn., commonly known as *Gunja*, belongs to the family *Fabaceae*. It is found commonly in China, the West Indies, South Africa, and throughout the plains of India, from the Himalayas down to southern India and Ceylon.[1] It is widely used in several *Ayurvedic* formulations with significant therapeutic effects. In *Sushrut Samhita*, its roots have been mentioned as *Sthavara Visha*,[2] while in *Rasashastra* texts, it is classified as an *Upavisha*.[3] Seeds of *A. precatorius* have also been used in therapeutics, and the purification of seeds has been considered before use for therapeutic purposes. Various biological activities have been demonstrated in *A. precatorius* seeds and roots in pharmacological screening studies, like anti-inflammatory, anti-bacterial, anti-spasmodic, anti-fungal, anti-tumour, anti-diabetic, and anti-migraine. The present paper is an attempt to validate the pharmacological properties and therapeutic uses of the plant described in ancient classical texts of Ayurveda and ethnomedicine by reverse pharmacology using evidence from studies published in indexed and peer-reviewed journals.

KEYWORDS: *Gunja, Upavisha, Ayurveda*, purification.

INTRODUCTION

Gunja is a widely branched, climbing undershrub with a woody stem**.** The leaves have 20-40 leaflets and resemble tamarind leaves. Flowers are pink, bluish and appear in cluster. Flowers

is in August-September and fruiting during winter.[4] Legumes are 1.5cm- 3.5cm long containing red, whiteand black colored seeds have black spot on their tips. *Gunja* is native to India, where it can be found ataltitudes of up to 1200 m on the outer Himalayas, but *Gunja* is now found in all tropical countries**.** *Gunja* seeds are also known as *Ratti* which has been a basic unit of weight because seeds have been used as a weight for the purpose of weighing. The root of *Gunja* is sweet, like *yastimadhu*. It has been observed in general practice that *Liquorice* is frequently adulterated with *Gunja* root due to its resemblance in external morphology and taste. *Gunja* root and seeds are used in traditional medicine totreat numerous health ailments. Most commonly leaves, roots and seeds of *Gunja* are being used for medicinal therapeutic preparation.

MATERIAL AND METHODS

A thorough literary survey has been conducted a part of MD (Ay.) Dravyaguna research study. Literature reviewed includes Ancient texts starting from Vedic literature to contemporary texts including indexed and peer reviewed journals for collection of information regarding pharmacological properties and therapeutic uses. The information collected from different sources has been critically analysed to validate ancient claims with evidences from pharmacological screening studies.

Vernicular names[5]

Sanskrit - Raktika, Kakananti

Latin - *Abrus precatorius*

English - Jequirity

Hindi - Ratti, Ghungchi

Punjabi - Mulati[6], Charmati

Telugu - Guriginja

Gujrati - Chanothi

Kashmiri - Gurugunji

Tamil - Kundamani

OBSERVATION SYNONYMS[7]

The commonly used synonyms of *Gunja* mentioned in nighantu texts with their etymological are beinglisted below.

S.NO.	NAME	MEANING
1.	*Kakachincha*	Seeds of Gunja resemble to tamrind seeds in producing sound.
2.	*Angarvallari*	Looking Fiery
3.	*Shikhandi*	Looking Cresty
4.	*Chakrasalya*	When flowering and climbing in circular way.
5.	*Durmoha*	It cause loss of consciousness in high dose.
6.	*Bahuphala*	Numerous legumes
7.	*Bahuveerya*	It is a potent drug.
8.	*Vanavasini*	It is a wild plant.
9.	*Sheetpaki*	Fruits ripe in winter.
10.	*Uchhata*	It is easily able to access higher areas.
11.	*Bhilabhushan*	It is used as tribals jwellary.
12.	*Kakatundika*	Resemble tamarind fruit making rattling sound when ripe.
13.	*Gunja*	Fruit making rattling sound when ripe.
14.	*Kakananti*	Fruits of Gunja making rattling sound when ripe.
15.	*Krishnala*	Seeds with black eye.
16.	*Raktika*	The seeds are red in colour.

Varieties of Abrus precatorius

On the basis of colour of seeds, *Gunja* has been said to be of two types viz. *Shweta* (white) & *Rakta* (red) (R.Ni.[8], K.Ni.[9], Pr.Ni.[10]). In addition to above two varieties, another variety viz. *Kaakadani* has also been considered by *Bhav Mishra* (BP.Ni).[11]

***Shweta Gunja* is considered more toxic than *Rakta Gunja*.[3]**

Abrus precatorius in Classical Texts

In *Charak Samhita*, the colour of *Shuddha rakta* (pure blood) (CS.Su.24.21)[12] and *Shuddha artava* (pure menstrual blood) (CS.Ci.30.226)[12] has been compared to the colour of *Rakta Gunja* in the *Charak Samhita*. Roots of *Gunja* are a constituent of *Kanakakshiri Taila,* used for *abhyanga* (external massage) in the management of Skin diseases (CS.Ci.7.111).[12]

In *Sushrut Samhita*, *Gunja* has been used in *Arsha* (Piles) as an an ointment (*Lepa*) **(**SS.Ci.6.12)[13], seed used for the preparation of *varti* (suppository) indicated in piles (AH.Ci.8.20)[14], also lepa in *Kaphaja Visarpa* (Erysepales) **(**SS.Ci.17.15)[13], *Gunja Patra* is used as a lepa in *Pittaj Visarpa* (HS.Tritiya sthana.33.11)[15], *Apachi* (chronic lymphadenopathy) **(**SS.Ci.18.19)[13], *Kaphaj Gandamala (Goitre)* (SS.Ci..18.49; AH.U.22.69)[13,14] and its roots have been mentioned in the group of 8 *moola visha* (SS.Ka.2.5).[13] Seeds of *Gunja* are used as an ointment (*Lepa*) in *Indralupta* (Alopecia) **(**SS.Ci.20.25; AH.U.24.29)[13,14], *Aushadhi dharyan* in *Putana Pratishedha adhyaya* (SS.U.32.8)[13] and *Sheeta putana pratishedha adhyaya* (SS.U.34.7).[13] Roots have been indicated for internal administration in *Tridoshaj Udara roga* (Disease of abdomen) (AH.Ci.15.78)[14], fruits have been used as a constituent in the preparation of *Bhallatakadi taila* indicated for local application in *Switra* (vitiligo), (AH.Ci.20.16)[14] and in *Dadru* (HS.Tritiya sthana.39.43).[15]

Gunja has been mentioned with the synonym *Shangishta* in *Sutika upkramniya addhaya* (Chapter on management of mother in puerperium) (KS.Kh.11.111)[16] and *Vyadhitarupiya addhaya* (BH.S.Vi.5.7)[17], used in the preparation of *ellamadhukaadi kawatha* with synonym *Sheetpaki* indicated in treatment of fever (KS.Kh.11.151)[16], *Gunjadya taila* indicated in *Apachi* (chronic lymphadenopathy), *Arbuda* (Tumour), *Arsha* (Piles) (CD.Ci.41.36-37)[18] in *Gandmala* (goiter) (VS.GandamalaRogaadhikara32)[19], *Gunjamuladi churnanjana* indicated in subconjunctival haemorrhage (*Arjuna*), Pterygium (*Arma*), *Timira* (Cataract), eye diseases (*Netra roga*) (CD.Ci.57.57)[18], *Andhya* (YR.U.369.1),[20] *Gunjanavanita yoga* for *Karnapalivardhana* (CD.Ci.59.146)[18], seeds a constituent of *Udayaddi Rasa* indicated in *Kustha* (Disease of skin) (Sg.S.M.k.12.192)[21], constituent of *Gunjagarbharasa* indicated in *Urusthambha*(stiffness in thigh muscle) (YR.Pu.563.1)[20], paste of root and fruit applied locally in *Indralupta* (Alopecia) (Sg.S.U.k.11.21)[21], constituent of *Avalgujabeejadi lepa* indicated in *switra* (vitiligo) (BP.Ci.54.152).[22] *Gunja phala* is used as a *lepa* in *Vatavyadhi* (Disoders due to vata and pitta dosha) *(*YR.Pu.544.1)[20], *taila in Kshudrachikitsa* (YR.U.280.1)[20] *and Gunjadi Udavartana* in *Kushtha*(Diseases of skin) (YR.U.228.). [20]

Gunja moola* (*Abrus precatorius* Linn.) as a substitute for *Madhuyasti (Glycyrrhiza glabra Linn.)

In classical texts book, it has been mentioned that in case non-availability of *Madhuyasti* (*Glycyrhiza glabra Linn.), Dhataki (Woodifordia futicoasa Salisb)* should be taken.[20,22,23]

Now a days, it is being observed that roots of *A. precatorius* are being used as adulterant / substitute for *Glycirrhiza glabra.* Some scholars have declared *A. precatorius* as official source for classical drug *Madhuyashthi.*[24,25] In this context, *Acharya P.V.Sharma* says that the root of *Gunja* is similar to *mulehti* due to its resemblance of external morphology and sweet taste. Some Vaidya use Gunja moola in place of *mulethi* due to lack of knowledge intentionally or un-intentionally (Pr.Ni.3.207).[10]

Synonyms of Abrus precatorious in different Nighantus text

S.NO.	SYNONYMS	A.Ni.[26]	P.R.[27]	Ni.Sh.[28]	S.Ni.[29]	Ni.Ad.[30]	Pr.Ni.[10]
1.	*Raktika*	+	+	+		+	+
2.	*Kakantika*	+	+			+	+
3.	*Shwetapaaki*	+					
4.	*Shikhandika*	+		+			
5.	*Krishnala*		+	+			
6.	*Kakadani*		+	+	+		
7.	*Kakatikta*		+				
8.	*Kakajangha,*		+				
9.	*Shangushta*		+				
10.	*Kakachincha*			+			
11.	*Kakanindika*			+			
12.	*Kakanakhi*			+			
13.	*Sheetpaki*			+			
14.	*Durmoha*			+			
15.	*Kakapilu*			+			
Abbreviations: A.Ni.- Ashtang Nighantu, P.R.-Pryayratnamala, Ni.Sh.-Nighantu shesh, S.Ni.-Shodal Nighantu, Ni.Ad.-Nighantu Adarsh, Pr.Ni.-Priy Nighantu							

Synonyms of *Rakta Gunja*

S.NO.	SYNONYMS	Md.Ni.[31]	Hr.Ni.[32].	MP.Ni.[33].	K.Ni.[9]	R.Ni.[8]	BP.Ni.[22]	Sh.Ni.[34]
1.	*Raktika*	+	+	+	+	+		+
2.	*Kaknantika*	+						
3.	*Chudamadi*	+			+	+		
4.	*Shikhandi*	+				+		
5.	*Shikhadini*							+
6.	*Sheetpaki*	+						
7.	*Kaknanti*		+			+		
8.	*Shikhandika*			+				
9.	*Tamra*			+	+			
10.	*Kakanasika*			+				
11.	*Gunja*				+	+		
12.	*Sughata*				+			
13.	*Manchuda*					+		
14.	*Vanyasya*					+		
15.	*Bhilabhushan*					+		
Abbreviations: Md.Ni.-Madanadi Nighatnu, Hr.Ni.-Hridaya Deepak Nighantu, MP.Ni.-								

MadanPal Nighantu, K.Ni.- Kaiyadev Nigantu, R.Ni.-Raj Nighantu, BP.Ni.- Bhav Praksh Nighantu,Sh.Ni.-ShaligramNighantu.

Synonyms of *Shweta Gunja*

S.NO.	SYNONYMS	Md.Ni.[31]	Hr.Ni.[32]	MP.Ni.[33]	K.Ni.[9]	R.Ni[8]	BP.Ni[22]	Sh.Ni[34].
1.	*Durmukha,*	+		+				
2.	*Kakapiluka*	+		+				
3.	*Kakadani*	+				+		+
4.	*Kakabhindi*	+						
5.	*Sheetpaki,*		+					
6.	*Shwetakamboi*		+			+		
7.	*Chakrika*			+	+			
8.	*Chud*			+				
9.	*Shweta*				+	+		
10.	*Shwetapaki*				+			
11.	*Kakapilu*				+	+		
12.	*Chakrashayla*				+			
13.	*Chirattika*				+			
14.	*Bhirintika*					+		+
15.	*Vakrashalya*					+		

Abbreviations: Md.Ni.-Madanadi Nighatnu, Hr.Ni.-Hridaya Deepak Nighantu, MP.Ni.-MadanPal Nighantu,
K.Ni.- Kaiyadev Nigantu, R.Ni.-Raj Nighantu, BP.Ni.- Bhav Praksh Nighantu,Sh.Ni.-Shaligram Nighantu.

PHARMACOLOGICAL PROPERTIES OF *GUNJA*[35]

Rasa- *Tikta,Kashaya*

Guna- *Tikshna,Laghu, Ruksha*

Virya - *Ushna*

Vipaka- *Katu*

Doshakarma- *Kapha Vatashamaka*

Karma- *Rasyana, Kasaghna, Keshya, Twachya, Jwaraghna, Kushtaghna etc.*

Pharmacological properties attributed to both the *Gunja* by different *Nighantus* texts.

Rasapanchak	**MP.Ni.[33]**	**K.Ni.[9]**	**R.Ni.[8]**	***BP.Ni.*** **[22]**	**Sh.Ni.[34]**	**Ni.Ad.[30]**
RASA						
Tikta Rasa		+	+		+	+
Kashaya Rasa		+			+	+
Swadu Rasa					+	
GUNA						
Ruksha						
VIRYA						
Usna		+	+		+	+
Anushna						

VIPAKA						
Katu						+
DOSHAGHNATHA						
Vatahkahahara						+
Kaphahara					+	
Vatapittahara				+		
Kaphapittahara	+	+				
Abbreviations: MP.Ni.-MadanPal Nighantu, K.Ni.- Kaiyadev Nigantu, R.Ni.-Raj Nighantu, BP.Ni.- Bhav Praksh Nighantu,Sh.Ni.-Shaligram Nighantu, Ni.Ad-Nigantu Adarsha.						

Therapeutic indication of *Abrus precatorious* as per Nighantu

Lepana (Md.Ni.[31]), *Keshya* (Disorder of hair) (MP.Ni.[33], K.Ni[9]., BP.Ni[22].), *Balya* (immunity promotor) (MP.Ni.[33], K.Ni[9].), *Tvachya* (Skin diseases) (MP.Ni.[33], K.Ni.[9], Sh.Ni.[34]), *Netraerogah*ar (diseases of Eye) (MP.Ni.[33], K.Ni.[9], BP.Ni.[22]), *Vrishya* (Aphrodisiac) (MP.Ni.[33], BP.Ni.[22]), *Kandu* (Itching) (MP.Ni.[33], BP.Ni.[22], Sh.Ni.[34]), *Vrana* (Ulcer) (MP.Ni.[33], K.Ni.[9], BP.Ni.[22]), *Krimi* (Worm infestation) (MP.Ni.[33], K.Ni.[9], BP.Ni.[22], Sh.Ni. [34]), *Kustha* (MP.Ni. [33], K.Ni.[9], BP.Ni.[22], Sh.Ni.[34]), *Indralupta* (Alopecia) (K.Ni.[9], BP.Ni.[22], Sh.Ni.[34]), *Jwara* (Fever) (BP.Ni.[22], Sh.Ni.[22]34]) *Mukhashosha* (BP.Ni. [22]), *Bhrama* (vertigo) (BP.Ni.[22], Sh.Ni.[34]) *Shwasa* (Asthma) (BP.Ni.[22], Sh.Ni.[34]) *Trishna* (BP.Ni. [22],Sh.Ni. [34]), *Madavinashna* (BP.Ni.[22], Sh.Ni[34].), *Shukrajanana* (Spermatogenesis) (K.Ni. [9]).

Therapeutic indications of Different parts of *A. precatorious* as per Nighantu Texts

Indications	**S.Ni.[36]**	**R.Ni.[8]**	**Sh.Ni.[34]**	**Pr.Ni.[10]**
SEED				
Vantikar (Emetic)		+	+	
Vatavyadhi (Disease due to vata roga)				+
Urusthambha (stiffness in thigh muscle)				+
Vrana (Ulcer)				+
Kustha (Disease of skin)	+			+
Shoolnashaka (painkiller)			+	
ROOT				
Vantikar (Emetic)		+		
Timir (Cataract)	+			
Shiroroga	+			
Krimidanta	+			
Vishanashaka			+	
LEAVES				
Shoolnashaka (Painkiller)		+		
Vishakrt		+		
Vishanashaka			+	
Abbreviations:S.Ni.-Shodal Nigantu, R.Ni.-Raj Nighantu, Sh.Ni.-Shaligram				

Nighantu, Pr.Ni. – Priya Nigantu.

PHYTOCHEMISTRY

Root	Abrol,abrasine,precasine and precool.[37-38] Protein, abraline, abricin, abrusgenic-acid, abrusgenic-acid-methyl-ester, abruslactone, abrussic-acid, anthocyanins, calcium, campesterol, cycloartenol, delphinidin, gallic-acid,trigonelline, hypaphorine.[39-40]
Leaves	Abrine, trigonelline[40], abruslactone A, hemiphloin,[41] abrusoside A,[42] abrusoside B, abrusoside C, abrusoside D,[43] arabinose, galactose, xylose.[44]
Seeds	Essential amino acids like serine,Abrusin,Abrusin Abrusin-2′-0-apioside, hederagenin,kaikasaponin III, sophoradiol, sophoradiol-22-0-acetate, tryptophan[43] trimethyl[45], alanine[46] amyrin, alpha, ursolic acid.[47]
Fixed oil	Fixed oil contains palmitic, stearic, arachidic, behenic, lignoceric, oleic, linoleic and linolenic acid**.**

TRADITIONAL USES

- The root is considered emetic and alexiteric.
- The roots are employed both in the east and in the West Indies as a substitute for Liquorice.
- In Ceylon the root is taken for sore throat and rheumatism.
- In cases of snake-bite the roots are applied to the bitten part (Vaghbata).
- In Cambodia the roots are used in the treatment of diarrhea and bark is prescribed in dysentery.[48-49]
- Abrus precatorius is traditionally used to treat tetanus, and to prevent rabies.[50]
- Leaves of the herb are used to cure fever, cough and cold.
- The roots are used to treat jaundice and haemoglobinuric bile.
- Paste of roots is used to cure abdominal pains, tumors and also for abortion.

THERAPEUTIC POTENIAL

1. Antimicrobial activity[51]

80% ethanolic extract of leaves exhibited antibacterial activity against Staphylococcus aureus however, it was inactive against Escherichia coli, Pseudomonas aeruginosa and Bacillus subtilis.

2. Alzheimer's Disease[52]

A. precatorius L. lectin have been used to identify microglial cells (MGC) activation in autoptic brain samples from Alzheimer's disease subject. *A. precatorius* agglutinin recognizes MGC in the cerebral white matter from all AD patients studied. These MGC are of rod-like types and appear to be particularly dense in those areas proximal to an

oligodendroglial cell. The identification of new markers for the study of MGC is very important to better understand the role of these types of cells in the metabolic/ dismetabolic control of bA4 in AD.

3. Antifertility

In Females[53]

Petroleum ether and alcoholic extracts of root on oral administration from day 1-5 post coitus prevented nidation of embryo in albino rats. Alcoholic extract of the drug also exhibited anti-oestrogenic activity when injected simultaneously with oestradiol. The LD of the drug was found to be2 g/kg (Agarwal et al., 1970).

In Males[54]

Alcoholic seed extract administered orally at a dose of 100 mg/kg bw/day to sexually mature male albino rats, revealed a significant lowering of the sperm motility with no effect on sperm concentration after 60d of feeding. Sperm morphology exhibited decapitation, acrosomal damage and formation of bulges on midpiece region of sperms in treated rats. Biochemical studies on epididymal spermatozoa indicated alterations in their energy and/or oxidative metabolism as evidenced by a fall in succinate dehydrogenase and ATPase levels allocation. There was no effect on body and organ weights of rats. The average number of implantation sites in females after mating with treated male rats markedly declined, while a significant increase in serum testosterone levels was seen during this period(Rao, 1987).

4. Antidiabetic Effect[55]

Chloroform – methanol extract of *A. precatorious* seeds exhibited decrease in the level of blood glucose on oral administration. This study therefore has shown that the chloroform – methanol extract of seed has some anti-diabetic properties similar to that of chlopropamide.

5. Anti-inflammatory Activity[56]

Two triterpenoid saponins 1 and 2 isolated from the aerial parts of *A. precatorius* and their acetates derivatives exhibited anti-inflammatory activity but the acetates showed greater inhibition at both 300 µg and 600 µg concentration than the parent compounds. Acetates derivatives of parent compounds were more effective at 600 µg concentration among all test treated group.

6. Antimalarial

An isoflavaquinone- abruquinone isolated from the extract of aerial parts exhibited antimalarial activity. Antiplasmodial activity and cytotoxicity in the assessment of antimalarial activity was further done[52]. The antiplasmodial activity was evaluated by the radioactive micromethod while cytotoxicity was estimated on melanoma cell (A375). Extract testing was performed at three different times in triplicate in 96-well culture plates with cultures mostly at ring stages at 0.5-1 % parasitemia. Abrus precatorius pentane extract presented an IC_{50} value below 20 g/ml.[57]

7. Nephroprotective[58]

Nephroprotective study of aqueous extract of arial parts of *A. preacatorius* was undertaken to determine the recovery effect of cisplatin and acetaminophen induced nephrotoxicity. Results of study showed that aqueous extract of ariel parts of *A. preacatorius* can be used for the prevention or treatment of renal thermore, using A. precatorius at an inappropriate dose will result in harmful affect. Several drugs have entered the international market as a result of ethnopharmacology and traditional medicine research. Medicinal drugs, on the other hand, have been used for thousands of years. The above-mentioned information on the pharmacognostic and pharmacological use of this plantis supported by existing literature. It is clear that *Abrus precatorius* is a very important plant due to its numerous medical qualities, which include antidiabetic, nephroprotective, neuroprotective, analgesic, and many others.

Thus, *Abrus precatorius* appears to be a promising multipurpose therapeutic agent, with future opportunities for preclinical studies on small animals screening out illnesses such as obesity, viral disease, Parkinsonism, and thyroid. Clinical trials should be conducted to demonstrate its efficacy in alarger population.

CONCLUSION

On a review of the literature, it emerged that the *Ayurvedic* texts have multiple formulations of the drug *Gunja*. Similar or very similar usage have been recorded from local heatlh Traditional practises. Meanwhile, such uses have been experimentally validated by many studies. Ayurvedic classical texts discuss two types of *Gunja*, namely *Shweta Gunja*, which is more toxic. Both varieties of *Gunja* are utilized for medicinal purposes, both internally and externally. *Acharyas* have specified various purification methods for *Gunja*. Improper purification can lead to toxic effects, but the texts also provideinformation on its antidote. Use of roots of *A. precatorius* as a substitute of *Glycirrhiza glabra* could not be justified.

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