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Gunja (*Abrus precatorius* Linn.) A precious toxic plant: A review

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Abstract

Visha means Poison are classified into three types viz. *sthavara*, *jangham* and *kritrima*. *Sthavara visha* are those which belong to group of poisonous plants, herbs, metals and minerals. *Gunja* is a plant poison that has mentioned in Ayurveda under the *sthavara vanaspathic visha*. According to modern it is an irritant organic vegetable poison belonging to family Leguminosae. The botanical name of *Gunja* is *Abrus precatorius* Linn. All parts of the plant are toxic, but most toxic part is seed, which contain active principle abrin. While eating whole seeds no toxicity visible in body but when crushed seeds are chewed or swallowed toxic symptoms appears. After proper purification *Gunja* is used as an ingredient in many Ayurvedic formulations and apply in various diseases like *shotha* (oedema), *kandu* (itching), *indralupta* (alopecia), *granthi* (tumour), *kustha* (leprosy) etc. Roots, seeds and leaves are used in traditional folklore medicine. There are many pharmacological properties and activities shown by this plant. Beside the toxic impact of *Gunja*, it is well known drug with therapeutic uses in Indian system of medicine. The present review article of *Gunja* highlights its synonyms, vernacular name, properties, toxicity, management, therapeutic uses, autopsy features and medicolegal importance.

Keywords: Gunja, ayurvedic properties, toxicity, therapeutic uses, medicolegal importance

Introduction

Agad tantra is a branch of Astang Ayurveda which broadly describes origin and types of *visha*, its symptoms and management. *Visha* means Poison are classified into three types viz. *sthavara*, *jangham* and *kritrima*. *Sthavara visha* are those which belong to group of poisonous plants, herbs, metals and minerals. *Jangham visha* are obtained from animals and *kritrima visha* means artificial poisons which are made from poisonous or nonpoisonous compounds^[1]. *Gunja* is a plant poison that has mentioned in Ayurveda under the *sthavara vanaspathic visha*^[2]. According to modern it is an irritant organic vegetable poison belonging to family Leguminosae. The botanical name of *Gunja* is *Abrus precatorius* Linn., which is derived from two greek word, *Abrus* means graceful and *precatorius* means to pray. It is also known as crab eye, Indian jequirity, Indian liquarice, rosary pea, ratti, prayer bead, weather plant, love bean, lucky bean, Buddhist rosary bead, Seminole bead^[3]. It is a bushy, slender, climbing plant found all over India. All parts of the plant are toxic but most toxic part is seed. By eating whole seeds no toxic system is visible in body but crushed seeds are chewed or swallowed toxic symptom visible^[4]. *Gunja* is used in making many Ayurvedic formulations after proper purification and apply in various diseases like *shotha* (oedema), *kandu*(itching), *indralupta* (alopecia), *granthi* (tumour), *kustha* (leprosy) etc.^[5]. In olden times Indians used the seed of *Gunja* to measure gold and silver and measuring was called as *ratti*^[6].

Vernacular names^[7]

- English - Jequirity
- Hindi - Ratti, Ghungchi
- Sanskrit - Raktik, Kakananti
- Bengali - Kunch, Shonkainch
- Tamil - Kuntri, Kunrimani, Kundamani, Gundumani
- Telugu - Guriginja, Gurivinda
- Urdu - Ghongcha, Ratti
- Kashmiri - Shangir
- Gujrati - Gumchi, Chanothi
- Punjabi - Mulati
- Kannada - Gurugunji

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Plant description

It has slender, tough branches with 5 to 10cm long compound leaves bearing 10-20 pairs of leaflet. Leaves are alternate, opposite, pinnately divided with small oblong leaflets. Its leaves look like Tamarid or Aamla leaves and sweet in taste. Stem are green when young, but develop grey bark as the plant matures. Flowers are pink, white or purple and borne in clusters [8]. Seeds are oval, tasteless, odourless and bright red in colour or sometimes white or black colour with a black spot on one end, about 5mm in diameter has an attractive hard glossay outer shape. Root is curved with many branches and its property is similar to the property of *Mulethi* (*Glycyrrhiza glabra*) [9].



Fig 1: *Glycyrrhiza glabra*



Fig 2: Pronunciation

Types of Gunja

There are two types- rakta *Gunja* (red variety) and sweta *Gunja* (white variety). Rakta *Gunja* is also known as *sikhandika*, *tamra*, *raktika*, *kakanasika* and sweta *Gunja* is known as *chakrika*, *durmukha*, *swetakamboji* [10].

Both varieties are hair tonic, antipyretic and reduce aggravated vata and pitta dosha. They also control dryness of mouth, dyspnoea, vertigo, thirst, eye diseases and aphrodisiacs [11].

Pharmacological properties [12]

Guna - *Laghu*, *Ruksha*

Rasa - *Tikta*, *Kasaya*

Veerya- *Ushna*

Vipaka - *Katu*

Karma- *Vrisya*, *Balya*, *Chakshusya*, *Shothahara*

Doshaghanta - *Kaphavatashamaka*

Rogaghnata- *Krimi*, *Indralupta*, *Kandu*, *Kustha*

Toxic part [13]

Seed

Therapeutic dose [14]

Seed powdered- 60-100 mg

Root/ Leaf powder -1-3 gm

Fatal dose [15]

90 -120mg or 1-2 crushed seed

Fatal period [16]: 3 to 5 days

Chemical constituents [17]

Root and leaves contain Precol, Abrol, Abrasine, Acid-methyl-ester, Procasine, Precol, Abraline, Abrussic acid, Anthocyanine, Glycyrrhizin.

Seeds contain Abrine, Precatorine, Abridin, Hypaphorine, Trigonelline, Tryptophan, Aglucoside, Abrussic acid, Haemagglutinn, Gallic acid, alanine, serine, Valine.

Substitutes and adulterants

Root and Leaves contain glycyrrhizin. Root has been used as a substitute for *Mulethi* [18].

Mode of action [19, 20].

Abrus seeds are harmless when ingested whole, since the hard outer shell resists digestion. But chewing or crushing of the seed release abrin. The "B" polypeptide chain binds to the intestinal cell membrane while "A" polypeptide chain enters the cytoplasm. In cytoplasm "A" act on 60S ribosomal subunit and prevents binding of elongation factor EF-2 thus inhibiting protein synthesis, thereby causing cell death.

Clinical manifestation of Gunja [21, 22, 23, 24].

The seeds contain an active principle abrin. Abrin is toxalbumin and its actions resemble those of viperine snake bite.

- If oral ingestion- causes pain in abdomen, diarrhea, bleeding per rectum, convulsion, CNS depression, vomiting, cardiac arrhythmias, cerebral oedema, elevations of liver enzyme.
- Ocular exposure- causes redness, chemosis, swelling and conjunctivitis.
- Dermal manifestations- redness, rashes.
- When an extract of seed is injected under the skin there is local inflammation, oozing of haemorrhagic fluid from the site of puncture, necrosis and septicemia.

Management of toxicity

Gunja is a highly toxic plant. The majority of toxicity mostly found in children who ingests seeds from plant or broken pieces of ornament. The toxicity of *Gunja* is managed by *swarasa* of *chowlayi* with sugar or cow's milk [25]. In contemporary science gastric lavage with charcoal, give anti abrin injection along with symptomatic management. Injection diazepam gives for convulsion and inj. of sodium carbonate to maintain alkalinity of urine [26].

Therapeutic uses of Gunja [27, 28]

- **Hoarseness and stomatitis:** The fresh leaves are chewed with cubeb and sugar to relive hoarseness of voice as in sore throat and stomatitis.
- **Leucoderma:** The paste of the leaves with *chitraka mula* is applied in skin diseases in leucoderma and also recommended as a cure for baldness over the scalp.
- **Eczema and scabies:** The paste of *Gunja* seed mixed with *bhrungraj* leave juice in eczema and scabies region.
- **Criminal abortion:** The paste of *Gunja* seeds converted into needle are inserted into vagina to procure abortion.
- **Sciatica and Paraplegia:** The paste of seed is used in sciatica, paraplegia and stiff shoulders.
- **Spermatorrhoea with bloody discharge:** The white *Abrus* leaves and heena leaves triturated with the powder of the root with cumin seeds and sugar are given internally.

- Fresh leaf extract along with boiled water is given orally to retain placenta.
- Roots and seeds are used for preparing tonic. Extract of leaf is applied on ringworm and also taken orally in snake

bite.

Ayurvedic preparations

Table 1: Formulations Rogadhikara

S.N.	Formulations	Dosage Form	Rogadhikara	Part used	Samhita reff.
1.	<i>Sarivadi vati</i> ^[29]	<i>Vati</i>	<i>Prameha</i>	<i>root</i>	<i>Bhaisajaya ratnavali</i>
2.	<i>Panchanan ghrīt</i> ^[30]	<i>Ghrīt</i>	<i>Shelipada</i>	<i>leaves</i>	<i>Bhaisajayratnavali</i>
3.	<i>Snuhiadya tailam</i> ^[31]	<i>Tail</i>	<i>Khaliya</i>	<i>Seed</i>	<i>Chakradatta</i>
4.	<i>Gunjadya tailam</i> ^[32]	<i>Tail</i>	<i>Kandu, Kustha</i>	<i>Seed</i>	<i>Chakradatta</i>
5.	<i>Gunjanavneet yoga</i> ^[33]	<i>Tail</i>	<i>Karnapali roga</i>	<i>Seed</i>	<i>Chakradatta</i>
6.	<i>Bhallatakadi lepa</i> ^[34]	<i>Lepa</i>	<i>Indralupta</i>	<i>Fruit, Root</i>	<i>Chakradatta</i>
7.	<i>Purnachandra rasa</i> ^[35]	<i>Rasa</i>	<i>Kshaya</i>	<i>Root</i>	<i>Rasaratna samuchchaya</i>
8.	<i>Kasisabadda rasa</i> ^[36]	<i>Rasa</i>	<i>Prameha</i>	<i>Seed, root</i>	<i>Rasaratna samuchchaya</i>
9.	<i>Laxmivilas rasa</i> ^[37]	<i>Rasa</i>	<i>Kshaya</i>	<i>Seed</i>	<i>Rasaratna samuchchaya</i>
10.	<i>Sarvangsundar rasa</i> ^[38]	<i>Rasa</i>	<i>Gulma</i>	<i>seed</i>	<i>Rasaratna samuchchaya</i>
11.	<i>Gunjamuladya anjanam</i> ^[39]	<i>Rasa</i>	<i>Timir roga</i>	<i>seed</i>	<i>Yogratnakar</i>

Autopsy features ^[40]

- Fragments of needle may be found in the skin along with oedema, inflammation, local necrosis.
- Haemorrhagic patches on the mucous membrane of GI tract and other organs like spleen, liver, lungs etc.
- Internal organs are congested and haemorrhagic.
- Patches of ecchymosis under skin, pleura, pericardium and peritoneum.

Medicolegal importance ^[41]

- The extract of the seed is used in rural area to kill cattle by injecting needles or suis made out of the dried seed paste.
- Occasionally for homicidal purpose
- Accidental poisoning
- The seeds are used as an abortifacient and as arrow poison
- Powders seeds are used by malingerers to produce conjunctivitis.

Conclusion

Gunja is an irritant organic vegetable poison which is mentioned in Ayurveda under the *sthavara vanaspathic visha*. All parts of the plant are toxic but most toxic part is seed. *Gunja* seed looks very attractive. Due to its attractive seeds it causes an accidental poison. After proper purification it is used as an ingredient to make many Ayurvedic preparations and apply in various diseases such as *shotha, kandu, kustha, krimi* etc., both externally as well as internally. Root, seed and leave are used in traditional folklore medicine. There are many pharmacological properties and activities shown by this plant. It is essential to take cognizance of the fact that misuse or overuse of plants can cause danger.

Discussion

Human and Animals depends for their food on plants and vegetables. Some plants are toxic for human and animals and causing serious harmful effects or even death. *Gunja* is well known toxic plant which is commonly found in many parts of India. Its two varieties are found viz. *Rakta Gunja* (red variety) and *Sweta Gunja* (white variety). Both are used for medicinal purpose.

Gunja also poses forensic importance. The seeds are used for cattle poisoning, for homicidal purpose and as an abortifacient. Parts of this plant like seed, root, leaves are use in many medicinal formulations like *Gunja bhadra rasa, Gunja taila, rajamrighanka rasa* etc. Beside the toxic impact

of this plant it is well known drug with therapeutic uses in Indian system of medicine.

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