

A REVIEW ON TOXICITY OF GUNJA (ABRUS PRECATORIUS)

Praveen Kumar^{*1}, Manish Rajak², Jai Kumar Singh³

^{*1,2}Post Graduate Scholar, Agada Tantra Evam Vidhi Vaidyaka

³Professor & H.O.D, Agada Tantra Evam Vidhi Vaidyaka
Government Ayurvedic College, Patna, Bihar, India

Corresponding Author: ayushpk5@gmail.com

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ABSTRACT

Gunja (Abrus precatorius Linn.) is a toxic plant which is described in various *Samhita* and other *Ayurvedic* texts. In *Sushruta Samhita Vishaja dravyas* are classified into *Sthavara*, *Jangama* and *Kritima Visha*. *Gunja* is mentioned in *Sthavara Visha*. In *Sthavara Visha* it is mentioned under *Moolaja Adhithan*, which is one of the ten *Adhithan* of *Sthavara Visha*. According to *Rasa Tarangani Sthavara Visha* are further divided into *Mahavisha* and *Upavisha*. *Gunja* is mentioned in *Upavisha* which is less potent toxic than *Mahavisha*. All parts of the plant are toxic, but the most toxic part is the seed which contains the active principle *abrin*. According to the modern concept, it is an irritant organic poison. In the *Ayurvedic* concept, if toxic plants are used after *Shodhana* process, they are useful in various types of diseases. The main aim of this study is to collect all the information related to *Gunja* and its toxicity.

Keywords: *Gunja*, *Visha*, Toxicity, *Abrin*, *Shodhana*

INTRODUCTION

Agada Tantra (1) is a branch of *Astang Ayurveda* that broadly describes the origin and types of *Visha*, its symptoms and management. *Acharya Sushruta* in the

3rd Chapter (*Jangam-Visavijaniya Adhyaya*) of *Kalpasthana*, defined *Visha* (Poison) as: - Because of producing *visada*, it became known as *Visha* (2). In

the modern concept Poison (3) can be defined as a substance that, when administered in any way, can act deleteriously on the body. A poison can be a solid, liquid or gas and can be inhaled, injected, or ingested.

Visha is classified into three types (4) viz. *Sthavara Visha*, *Jangama Visha*, *Kritrima Visha*

Gunja is a plant poison that has mentioned in *Ayurveda* under the *Sthavara Vanaspathic Visha*. *Acharya Sushruta* classified *Gunja* under *Moola-Visha* (5). In *Bhavprakash Nighantu* it is mentioned under *Guduchyadi varga*, and other *Rasashastra* texts mentioned it under *Upa-Visha* (6, 7) which is less potent toxic than *Mahavisha*. According to modern, it is an irritant organic vegetable poison (8) belonging to the family Leguminosae. The botanical name of *Gunja* is *Abrus precatorius* Linn. *Abrus precatorius* known commonly as Rosary Pea, Jequirity bean, Indian bead, Buddhist Rosary bead, Seminole bead, Prayer bead, Jungle bead, Crab's eye, Weather plant, Love bean, Lucky bean, Ojo de pajaro, Indian liquorice (9). It is a slender climbing plant found all over India. Though all parts of the plant are poisonous, the most toxic part is the seed which contains the active principle abrin. The seeds of *Gunja* very similar in weight in older times Indians used to measure using these seeds and the measure were called *Ratti* (10).

General Description: It is a tropical, ornamental, twining, woody vine which grows to a height of 10 - 20 feet when supported by other plants. It has slender, tough branches with 5 to 10 cm long compound leaf bearing 10-20 pairs of leaflets (11). Leaves are alternate, opposite, pinnately divided into small oblong leaflets. The leaves are like tamarind trees and sweet. Flowers are pink, purple, or white and borne in clusters. The distinctive part of the plant is the seed which is oval and has an attractive hard glossy outer shell that is usually scarlet red with a black centre. The seeds are present inside fruit pods, each containing 3 to 5 seeds. The pods split open when ripe. The pod is a legume (pea-shaped pod) and is about 3 cm long. The seeds are of the size of small peas, approx 0.85 cms x 0.65 cms (8 mm x 6 mm) in

size, its average weight is 110 mg. The beautiful red coloured seeds are egg-shaped having a black spot at one end. Rarely the seeds may be coloured white with black spots or maybe all white, black, yellow, or blue (12).

Vernacular Names (13):

Sanskrit: *Gunja*, *Raktika*, *Kakananti*, *Tamrika*,

Hindi: *Ratti*, *Ghunghuchi*,

English: Indian liquorice, Jequirity, Rosary Pea,

Urdu: *Ghongcha*, *Ratti*,

Marathi: *Gunjha*,

Telugu: *Guriginja*,

Gujarati: *Chanothi*

Types of Gunja:

It is of two types-

A. *Rakta Gunja* (red colour of seed variety)

B. *Sweta Gunja* (white colour of seed variety)

Classical Categorisation (14):

- *Sushruta - Moola Visha*
- *Kaiyadeva Nighantu - Oshadhi Varga*
- *Dhanvantari Nighantu - Karveeradi Varga*
- *Bhavaprakash - Guduchyadi Varga, Upavisha*
- *Rajanighantu - Guduchyadi Varga*

Rasa Panchaka:

- *Rasa: Tikta, Kasaya*
- *Guna: Laghu, Ruksha*
- *Veerya: Usna*
- *Vipaka: Katu*
- *Karma: Kaphavatahara, Vrisyā, Balya*

Toxic part: Seeds, root, leaves.

But the most toxic part is a seed.

Chemical constituents: The seeds contain an active principle known as Abrin, a toxalbumin like ricin and its action resembles that of viperine snake venom (15). In addition, the *Gunja* seeds contain some poisonous proteins- abrine, N-methyl tryptophane, abraline (a glucoside), a lipolytic enzyme, abruccic acid, haemagglutinin and some urease.

Mode of Action: Abrin is a powerful gastrointestinal toxin and one of its polypeptide chains (B) binds to the intestinal cell membrane, while the other chain (A) enters the cytoplasm. Once in the cell, the A chain acts on the 60S ribosomal subunit, preventing

binding of elongation factor 2, thus inhibiting protein synthesis and leading to cell demise (16).

Clinical features (17):

1. Ingestion of seeds or extract:

When the seeds are swallowed raw or after cooking, they are not poisonous. Seeds must be crushed or chewed for harmful effects to occur.

Ingestion of seeds or extract causes:

- a. Severe irritation of upper GIT, Abdominal pain, Nausea, Vomiting, Bloody diarrhoea, Rectal bleeding
- b. Weakness, Cold perspiration, Trembling of the hands.
- c. Weak rapid pulse, Tachycardia
- d. Headache, Dilated pupils, Hallucinations, Drowsiness, Tetany and Circulatory collapse

2. Injection of the extract under the skin causes:

- a. Painful inflammation, Oedema, Necrosis, and Oozing of haemorrhage fluid from the puncture site.
- b. Tetanic convulsion and cerebral Oedema
- c. Cardiovascular manifestation (like Snake bite), Arrhythmia, Circulatory collapse, Irregular Pulse
- d. Hemolysis, Oliguria and Uraemia

Fatal dose: 90-120 mg by injection, 1-2 crushed seeds by mouth

Fatal Period: 3-5 days

Signs & Symptoms: As per *Ayurveda*

Gunja poisoning is manifested by:

Daurbalya (Weakness), *Rakta Srava* (Bleeding), *Tandra* (Fatigue), *Moha* (Stupor), *Gatra Vrana* (Ulceration)

Differential diagnosis (18):

Table 1: Differential diagnosis of Abrin Toxicity

Features	Abrin	Viper
a. History	Inj. Abrin	Viper bite
b. Fang mark	Not Present	Present
c. Fragment of Abrin	Found	Not found
d. Local hemorrhagic oozing	Mild	Severe
e. BT/CT	Average	Increases
f. Systemic bleeding	Not found	Often found
g. Subconjunctival bleeding	Not found	Often found

Management of Toxicity:

A. Ayurvedic Treatment:

- 1. *Meghanada (Tanduliya) Swarasa* (19) along with *Sarkara* (Sugar) should be consumed and followed by gulping of milk. This is a prescription for poisoning due to *Gunja*.
- 2. Uses of antidote like- *Madhu-Sarkara yukta Grithpana, Haritaki Kashaya, Aphim, Belladonna, Karpoora, Gunja, Tobacco*
- 3. Give cow's milk with sugar.

B. Modern Treatment:

- 1. Resuscitation: Monitor and maintenance of ABC (Airway, Breathing & Circulation)
- 2. Removal of unabsorbed Poison:
 - a. If the Patient is conscious- Induced emesis.
 - b. If Patient is unconscious- Mild purgation with stomach wash with KMnO₄ Solution- 1:1000

- 3. Removal of absorbed Poison- Forced diuresis.
- 4. Excision of the local part containing the *sui* or *sutari* may lead to uneventful recovery of the animal or the patient.
- 5. Anti-abrin an antiserum is to be used with success as treatment in *Abrus* poisoning.
- 6. Supportive measures with special emphasis on rehydration. Close attention should be given to haematological parameters.
- 7. Alkalinisation of the urine probably has a role in preventing the crystallization of haemoglobin and should be considered in severe poisoning.
- 8. Occular exposure necessitates copious irrigation with running water for at least 15 minutes.
- 9. Other symptomatic measures are to be taken as per requirement.

Post-mortem appearances:

External:

- **Injected poison:** - Inflammation, swelling, oozing, wound necrosis etc (20)., Fragments of *sui* are usually found in the wound (21).
- **Ingested poison:** - Not specific

Internal:

- **Injected poison:** - Not specific
- **Ingested poison:** - Inflammation and congestion with erosion, submucous haemorrhage in GIT

Medico- legal Importance:

1. Accidental poisoning: Common
- In children who, out of curiosity, chew beautiful attractive seeds and
- Due to overdose when taken as a birth control pill.
2. *Suis* is used to kill cattle either to produce cheap hides or for revenge.
3. For homicide, the needle is kept between fingers and giving a slap which drives the needle into the body.
4. *Abrus* can be used as an arrow poison.
5. Malingers use powdered seeds to produce conjunctivitis.

CONCLUSION

Gunja (*Abrus precatorius*) is a toxic plant that is mentioned in various *Samhitas* of *Ayurveda* under *Sthavara Vanaspatik Visha*. It is also mentioned in *Upavisha Varga*. All parts of this plant are toxic, but the seed is the most toxic part. The seeds of *Gunja* plant are red and black, due to its colour it looks very attractive. Due to its abundant availability in villages and its attractive colour the children of villages play with these attractive seeds and so accidental poisoning is quite common among them. In the *Ayurvedic* concept, if toxic plants are used after proper purification methods i.e. *Shodhana* process, they are useful in various types of diseases. So, there is a necessity to have more knowledge regarding its toxic properties, its adverse effects and its *Shodhana* process, which plays a great role to reduce its toxicity.

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