

# A Comparative Study of *Abrus Precatorius* by Three Different Methods of *Shodhana*

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**Abstract** - *Gunja* (*Abrus precatorius* linn.) described under the category of *upavisha*, a sub-poisonous drug in *Ayurveda*. Seeds of *gunja* have active principle Abrin, which is said to have toxic properties, which can cause severe nausea, vomiting, convulsions, liver failure, severe purgation and death. Also no antidote exists for abrin, the most important factor is avoiding abrin. There are many *Ayurvedic* medicines which contain *gunja* as a key ingredient. *Gunja* seeds are used only after processing in certain medias, known as *shodhana* process. In the present study, *rakta gunja* seeds were processed in three medias *godugdha*, *kanji* and water at same temperature and evaluated against the raw sample for its abrin content. The study was conducted to evaluate which media reduces abrin to its maximum. Abrin is a protein, which is denatured when subjected to high temperature and removes its toxicity.

**Index Terms** - *Abrus precatorius*, Abrin, *Shodhana*, *godugdha*, *kanji* and water.

## I. INTRODUCTION

*Ayurveda* is an Indian traditional system of medicine. Some *Ayurvedic* medicine contains *visha dravya* as key ingredients. Though *visha dravya* are toxic in nature, but they are used in medicine. Because they have properties like *ushna*, *teekshna*, *vyavayi*, *vikashi*, *ashukaritwa*, they spreads and act all over the body quickly.<sup>[1]</sup> So, the demand of using such medicines are increased. Before using these *visha dravya*, they should undergoes into some procedures which denatures the toxic effects and enhances the efficacy of drugs. This procedure is called as *shodhana*. The concept of *shodhana* is not a purification or detoxification (removing toxic substances), but it reduces the toxic effects and enhances the therapeutics benefits of drugs ( in relation to *visha dravya shodhana*). *Shodhana* procedures includes *nirvapana* (cooling), *dhalana* (melting and dipping into liquid media), *bharjana* (roasting), *swedana* (steaming), etc. <sup>[2]</sup> The term *visha* is named from *vishada*.

Substances that enters and vitiates the healthy *dhatu* (structural components, tissues) of the body and may or may not manifest with lethal signs and symptoms, is termed as *visha*.<sup>[3]</sup> Major classification of *visha dravya* are into two, (based on their strength) *visha (mahavisha)* and *upvisha*.<sup>[4]</sup> Other classification include *akritim* (nature) and *kritim* (artificial) or *sthavara visha*, *jangam visha* and *samyojana visha*. Author of *Rasatarangini* has enumerated and considered *gunja* (*Abrus precatorius*) as one of the *upvisha* or sub-poisonous drugs.<sup>[5]</sup> Fruits, roots and seeds are the parts which are used in the medicines. Only seeds are toxic in nature.

*Abrus precatorius* is a slender, perennial climbers that twines around trees, shrubs and hedges. It is a legume with long, pinnate-leafleted leaves. *Gunja* seeds are commonly used as cattle poison, arrow poison or sometimes used as birth control pills.<sup>[6]</sup> The major active principle of *gunja* seeds is Abrin, a toxalbumin (or protein). Ingestion of raw crushed seeds ( or improper *shodhita*) causes severe purgation and vomiting leading to toxic symptoms in the body <sup>[7]</sup> also GI irritation, nausea, abdominal pain. Therefore *shodhana* of *gunja* seeds were done. *Swedana* process is described for the *shodhana* of *gunja* seeds by *dolayantra* method.<sup>[8]</sup> Present study deals with comparative study, by *shodhana* process of *rakta gunja* seeds in three different medias.

## II. AIM

To study and compare the level of Abrin content in *gunja* seeds at before and after *shodhana* process in three different medias i.e. *godugdha*, *kanji* and water by analytical techniques.

## III. OBJECTIVES

- 1) To perform the *shodhana* of *gunja* seeds in three different medias.
- 2) Analyse the *shuddha gunja* seeds with their respective medias.

3) Evaluate and compare the Abrin content of *ashuddha gunja* seeds and *shodhita gunja* seeds with their respective medias by using analytical tools.

#### IV. METHODOLOGY

##### A. Type of study

Experimental study.

##### B. Materials

Raw material : *Ashuddha rakta gunja* seeds ( *Abrus Precatorius* Linn.)

Other materials : *Gudugdha* (cow milk), *Kanji* (sour gruel), water.

Equipments : Weighing machine, measuring cylinder, muslin cloth, vessel, spatula, rod, gas stove, match stick, cotton thread.

##### C. Method

Collection : The raw *gunja* seeds were procured from local market.

Identification : *Gunja* seeds were identified by dravyaguna department of our institute.

Standardisation : Raw *gunja* seeds were powdered and analysed. The findings were compared with monographs mentioned in API.

*Shodhana* procedure :

1. Required quantity of raw *gunja* seeds were weighed with the help of weighing machine.

2. Raw *gunja* seeds were placed in muslin cloth and all four corners were tied with thread in such a way that it form a *pottali*.

3. This *pottali* was hanged upon a rod in a vessel containing *Gudugdha* in such a way that it completely immersed in it. (like *Dolayantra*) (image no.3)

4. This vessel is kept upon gas stove and turned on with matchstick.

5. Six hours of continuous heat was given to it. During process, stirring was done with spatula so that liquid doesn't comes out from vessel while boiling.

6. When level of the liquid media decreases, liquid were poured into it, so that *pottali* is completely immersed in the media.

7. After self cooling, *pottali* was removed and *shodhita gunja* seeds was washed with luke warm water and kept for drying.

8. Likewise, *shodhana* of *gunja* seeds were done in *kanji* media and water media for 3 hours.

Liquid media for <i>shodhana</i>	<i>Godugdha</i>	<i>Kanji</i>	Water
Method used for <i>shodhana</i>	<i>Swedana in Dolayantra</i>	<i>Swedana in Dolayantra</i>	<i>Swedana in Dolayantra</i>
Heat given in hrs	6 hrs (2 yaam)	3 hrs (1 yaam)	3 hrs (1 yaam)

Table no. 1 showing *shodhana* process.

Precautions :

*Pottali* was not touched at base of the vessel during the procedure. *Pottali* was completely and continuously immersed in the media. *Mandagni* was given throughout the procedure. ( About temperature of 100 degree was maintained throughout the process) (image no.4)

Analytical study :

Organoleptic characteristics, physico-chemical analysis and TLC of *ashuddha gunja*, *shuddha gunja* and media in which *shodhana* has done.

Method applied for TLC analysis :

Methanolic extract of *gunja* seeds and liquid media were used.

Mobile phase – Tolnene : Ethyl acetate : Glacial acetic acid = ( 6 : 3.5 : 0.5 ) v/v/v

Reagent – Spray with vanilline ( H<sub>2</sub>SO<sub>4</sub> )

#### V. RESULTS

Parame ter	A.G.	G.S.G.	K.S.G.	W.S.G.
<i>Shabdha</i>	NA	NA	NA	NA
<i>Sparsha</i>	Smooth	Smooth	Smooth	Smooth
<i>Roopa</i>	Black spot on reddish colour	Black spot on dull yellow colour	Black spot on dull yellow colour	Black spot on light creamish yellow colour
<i>Rasa</i>	-	-	-	-
<i>Gandha</i>	Not specific	characte rstics	characte rstics	Not specific
Wight	100 gm	95 gm	94 gm	96gm

Table no.2 showing organoleptic characteristics of *ashuddha* and *shuddha* *gunja* seeds.

A.G. – *Ashuddha Gunja* seeds, G.S.G. – *Godugdha Shodhita Gunja* seeds.

K.S.G. – *Kanji Shodhita Gunja* seeds, W.S.G. – *Water Shodhita Gunja* seeds.

Parameter	Godugdha media	Kanji media	Water media
Shabdha	NA	NA	NA
Sparsha	Semisolid	Semisolid	watery
Roopa	Creamish yellow	Light yellow	Blackish
Rasa	-	-	-
Gandha	Not specific	Not specific	Not specific

Table no.3 showing organoleptic characteristics of liquid media in which *shodhana* has done.

Parameter	Normal range	A.G.	G.S.G.	K.S.G.	W.S.G.
Foreign matter	NMT 2%	Nil	Nil	Nil	Nil
Ash value	NMT 3%	2.92 %	2.48 %	2.32 %	2.84 %
Acid insoluble ash	NMT 0.5%	0.47 %	0.27 %	0.35 %	0.41 %
Alcohol soluble extract	NLT 3%	3.29 %	3.86 %	3.16 %	3.12 %
Water soluble extract	NLT 15%	17.75 %	17.11 %	16.97 %	16.05 %

Table no.4 showing physico-chemical of *ashuddha* and *shuddha gunja* seeds.

	A.G.	G.S.G.	K.S.G.	W.S.G.
Rf value of abrin	0.30	0.25	0.25	0.30
Rf value of abrusogenin	0.60 & 0.70	0.40 & 0.70	0.70	0.50 & 0.70

Table no.5 showing TLC of *gunja* seeds before and after *shodhana*.

	Godugdha media	Kanji media	Water media
Rf value of abrin	0.30	0.40	0.40

Table no.6 showing TLC of liquid media

## VI. DISCUSSION

The concept of *shodhana* is to denature the toxicity and enhance the therapeutic effects. In this study, three media were used to do *shodhana* of *rakta gunja* seeds. *Godugdha* and *kanji* are the medias described in text for the *shodhana* of *gunja*. A new media was used to verify whether it can alter or reduces the toxic

effects. The reason behind this is that, if water soluble extract causes toxicity then it can replace the *godugdha* or *kanji* media for *shodhana* process. On analysing the raw *gunja* seeds, it found that the values were in the limit as mentioned in the monographs in API. On comparing all *shodhita gunja* seeds, it found that water soluble extract and alcohol soluble extract was found higher in *godugdha shodhita gunja* seeds and lesser in water *shodhita gunja* seeds. This may be due the presence of protein content in *gunja* seeds are more soluble in milk than *kanji* and water and also milk has higher affinity to dissolve the protein content. Ash value and acid insoluble ash was found lesser in *godugdha shodhita gunja* seeds than *kanji* and water *shodhita gunja* seeds. Colour and weight of *gunja* seeds were changed after *shodhana* process. TLC of *ashuddha gunja* seeds shows presence of Abrin content with rf value 0.30 and abrusogenin with rf value 0.60 and 0.70. On comparing TLC of all *shodhita gunja* seeds, rf values of Abrin was found different in *godugdha* and *kanji shodhita gunja* seeds ( conversion of 0.30 into 0.25 ) whereas rf value remain same in water *shodhita gunja* seeds and also rf values of abrusogenin was found different in *godugdha* and water *shodhita gunja* seeds ( conversion of 0.60 and 0.70 into 0.40 and 0.70, 0.50 and 0.70 respectively ) with disappearance of one of rf value in *kanji shodhita gunja* seeds. Reason behind may be that structure of Abrin content containing rf value is converted into some other component of Abrin having different rf value which may shows less toxicity. On analysing the TLC of all liquid medias in which *shodhana* was performed, it found that media show same rf value of Abrin ( 0.30 ) which was seen in *ashuddha gunja* seeds. Reason may be that some of Abrin content having rf value from *ashuddha gunja* seeds was dissolve or transferred into liquid *godugdha* media thereby reducing the toxic effects of *gunja* seeds. Also found that *kanji* media and water media shows different rf value of Abrin content ( conversion of 0.30 into 0.40 ). This may be due to commencement of chemical reaction between media and *gunja* seeds in heating process thereby leading to formation of new component or structure of Abrin.

## VII. CONCLUSION

On performing the *shodhana* of *gunja* seeds in all three different medias, there was increase in alcohol soluble extract and water soluble extract, and also decrease in ash value and acid insoluble ash of all *shodhita gunja* when compared to *ashuddha gunja* seeds. TLC of Abrin content was altered in *godugdha shodhita gunja* seeds after *shodhana*. TLC of Abrin content was altered in all liquid medias in which *shodhana* of *gunja* seeds has done whereas the presence of same rf value ( 0.30 ) of *ashuddha gunja* seeds in *godugdha* media indicating some of Abrin content is

transported in it. So, study concluded that *shodhana* of *gunja* seeds in *godugdha* is more effective than *kanji* and water.

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Image no.1 showing TLC of *ashuddha gunja* seeds and *shuddha gunja* seeds.

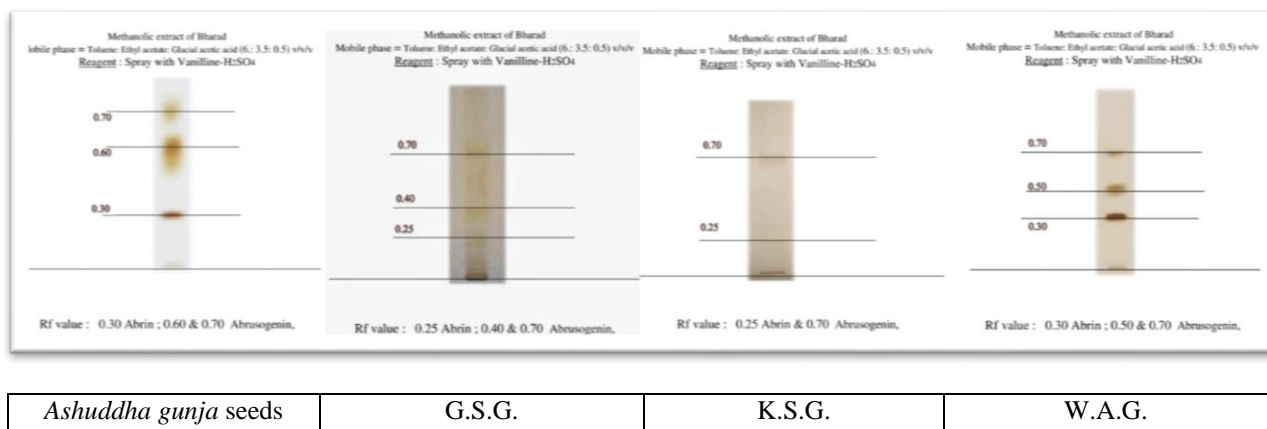


Image no.2 showing TLC of liquid media.

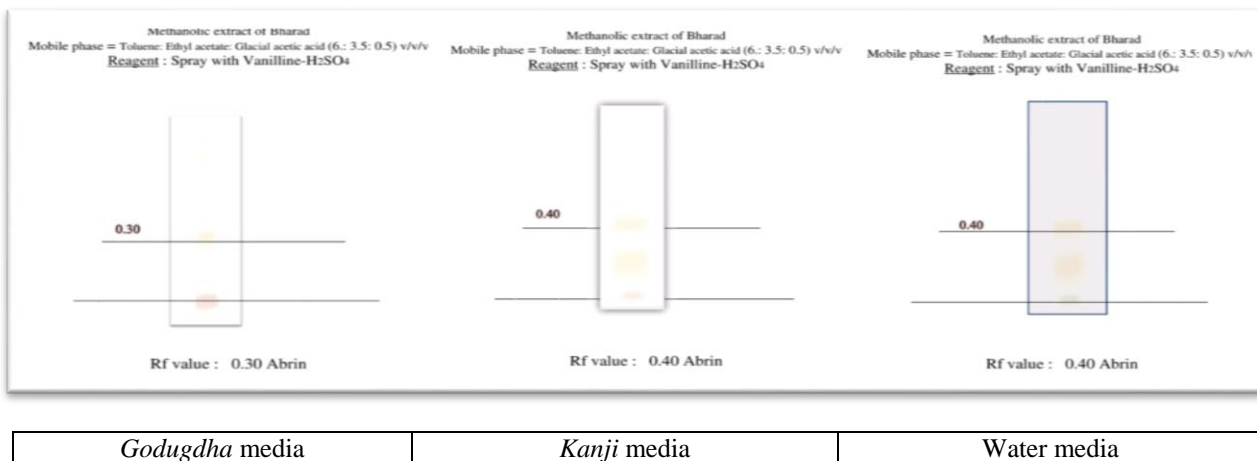


Image no.3 showing *dolayantra* method used for *shodhana* process (W.S.G.).



Image no.4 showing *agni* (heat)(low flame) used for *shodhana*.



Image no.5 showing *shodhana* of *gunja* seeds in *godugdha* media.



Image no.6 showing in-process *shodhana* of *gunja* seeds in *godugdha* media.



Image no.7 showing *shuddha gunja* seeds.

