

**DETERMINATION OF RASA PANCHAKA (5 AYURVEDIC PRINCIPLES OF DRUG ACTION) OF A FOLK DRUG - *Alstonia venenata* R. Br.**Anusha P R<sup>1</sup>, Chandrakanth Bhat<sup>2</sup>, Hariprasad Shetty<sup>3</sup>, Sudhakar Bhat<sup>4</sup><sup>1</sup>PG Scholar department of Dravyaguna, MIAMS, Manipal-576104, Karnataka, India.<sup>2</sup>HOD and Professor, Department of PG studies in Dravyaguna, MIAMS, Manipal-576104, Karnataka, India.<sup>3</sup>Professor, Department of PG studies in Dravyaguna, MIAMS, Manipal-576104, Karnataka, India.<sup>4</sup>Research officer, SDM Center for research in Ayurveda and Allied Sciences Kuthpady, Udupi- 574118, Karnataka, India.**Corresponding Author:** [dranushapr@gmail.com](mailto:dranushapr@gmail.com)<https://doi.org/10.46607/iamj1408082020>**(Published online: August 2020)****Open Access**

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**Article Received:** 29/007/2020 - **Peer Reviewed:** 07/08/2020 - **Accepted for Publication:** 07/08/2020**ABSTRACT**

**Background and Objective:** Systematic study of the folklore knowledge on herbal drug contributes to its conservation and preservation. Documentation of drugs in Ayurveda is based on the five principles called *Rasa Panchaka* (5 Ayurvedic principles of drug action). *Alstonia venenata* R. Br is a small tree belonging to Apocynaceae family. Its stem bark is used by tribes in fever, epilepsy and as anti-venom in snake bites. The aim of this study is to determine the *Rasa Panchaka* (5 Ayurvedic principles of drug action) of *Alstonia venenata* R. Br.

**Methods:** Detailed review of the trial drug was carried out. Rasa (taste) was determined by using direct perception method on 30 healthy volunteers. *Veerya* (potency) was determined by assessing the exothermic and endothermic reaction of the drug in water. *Vipaka* (taste after digestion), *Guna* (properties) and *Prabhava* (specific action) were assessed by experimental study of the drug on 12 Wister Albino rats.

**Result and Conclusion:** After the study *Rasa panchaka* (5 Ayurvedic principles of drug action) of the test drug was accessed as *Tikta* (bitter) *Rasa* (taste), *Laghu* (light) *Rooksha* (dry) *Guna* (property), *Sheetha* (cold) *Veerya* (potency) and *Katu* (pungent) *Vipaka* (taste after digestion).

**Keywords:** folklore, *Alstonia venenata* R. Br., *Rasa Panchaka*, experimental study

## INTRODUCTION

India has large variety of plants with medicinal and pharmacological values. Folklore and exotic plants not yet been stated in Ayurvedic texts are termed as Anukta Dravyas. Medicinal plants are scientifically documented in Ayurvedic literature based on sound fundamentals of *Rasa* (taste), *Guna* (properties), *Veerya* (potency), *Vipaka* (taste after digestion) and *Prabhava* (specific action). Vedic to *Samhita* and *Samhita* to *Nighantu Kala* evidenced chronological up gradation of medicinal plants. Inclusion of new drugs has been the tradition of Ayurveda. *Alstonia venenata* R. Br. is a small tree belonging to Apocynaceae family which is used as antipyretic, anti-epileptic and as anti-venom for snake bites among tribes. Here in this study attempts are made to determine the *Rasa Panchaka* (5 Ayurvedic principles of drug action)) of the drug *Alstonia venenata* R. Br. in order to document and conserve it.

### Materials And Methods

#### 1. Assessment of *rasa* (taste)

*Rasa* (taste) is detected when it comes in contact with Rasanendriya (tongue) <sup>1</sup>. Taste of a drug is assessed by local and systemic actions produced by it on the body. Factors like season, place of collection, state of drug- wet or dry, parts used and variation in intensity of tastes in a drug, need to be considered before the assessment.

#### Procedure <sup>2</sup>

30 healthy volunteers who can detect taste were selected (Ayurvedic students) and were served with 5g of fine powder of the test drug, after cleaning their mouths with water 30 minutes prior to experiment. They were asked to keep it in mouth for 2-3 minute and requested to note down the *rasa* perceived immediately after contact with drug as *Pradhana rasa* (main taste) and the one they perceived later as *Anurasa* (secondary taste) It was a single blind study.

#### 2. Assessment of *Vipaka* (taste after digestion) and *Guna* (qualities)

After the drug is ingested, it has to be digested and metabolized. During these processes, the drug is bro-

ken down and reformed or resynthesized which is called *Vipaka* (taste after digestion). If the *Mahaboota* (5 material elements) composition of the reformed substance remains the same as that of original drug, the pharmacological properties remains same as that of original drug, but if the composition changes, the pharmacological actions of the drug will also change<sup>3</sup>. *Vipaka* (taste after digestion) is assessed through its *karma* (action) <sup>4</sup>.

#### Procedure <sup>5</sup>

- 12 Wister albino rats were weighed, marked and made in to two groups of 6 each
- Each rat was kept in separate metabolic cages and provided with constant amount of food (100g) and water (200ml) daily for 15 days.
- After every 24 hours, rats in both groups were observed for parameters, which were measured and noted.
- Test drug was given to one group from 6<sup>th</sup> day to 15<sup>th</sup> day for 10 days using needle.
- Absolute and relative values of each parameter during preliminary (first 5 days without medicine) and therapeutic phases (next 10 days with medicine) of all rats were calculated.
- Values of each parameters recorded daily is the absolute value. Relative value is absolute value divided by wt. multiplied by 100

$RFI = AFI/Wt. \times 100$ . These readings were maintained for further statistical evaluations.

Parameters observed in *Vipaka* assessment are:

Food intake, Water intake, Urine output, Faecal wet, Faecal dry = Faecal wet kept in drier for 24hrs, Food conversion ratio= Food intake/Faecal dry, Faecal water = Faecal wet- Faecal dry, % of Body weight= [(Final wt. - initial wt.)/ initial wt.] x 100

**3. Assessment of *Veerya* (potency):** The factor in a drug responsible for its action is *Veerya*<sup>5</sup>. *Veerya* determination is done from the action drug produces after coming in contact with body till its excretion after digestion. *Veerya* is perceived through direct perception and also by inference.

### Reaction in water (thermometer method) <sup>6</sup>

**3.1. Method 1:** Temperature at different volumes of drug

**Procedure:** Drug powder (2g) was taken and mixed with different volumes (5ml, 10ml, 15ml) of water and temperature noted using thermometer at every 5 minutes for 30 minutes.

**3.2. Method 2:** Temperature at different concentrations of drug

**Procedure:** 2, 4, and 6 grams of drug were mixed with 10 ml of water and temperature was noted at every 5 minutes for 30 minutes.

### 4. Assessment of *prabhava* (specific action) <sup>7</sup>

*Prabhava* is a term which shows limit of our knowledge about rational explanation of drug action. Special action which cannot be explained in terms of fundamentals can be taken as *Prabhava*. These are

drugs with different configuration of Mahaboota (5 material elements) but with similar weight and number

**Statistical calculations:** Values of each parameter of all the groups were expressed in MEAN± SEM. The data were analyzed by one- way ANOVA followed by Dunnett's multiple comparisons t- test as post hoc test. Graph Pad InStat 3 was used for calculations. A level of p 0.05 was considered as statistically significant. Levels of significance were noted and interpreted accordingly.

**Animal ethics committee clearance:** The research was conducted at SDM center for research in Ayurveda and Allied sciences, Kuthpady, Udupi, Karnataka. Approval no SDMCRA/IAEC/M.DG.02 by IAEC in its meeting conducted on 26/03/2018.

## Results and Conclusion

1. Observation and result of Rasa study

**Table 1:** Results of Rasa determination of stem bark of *Alstonia venenata* R. Br. in 30 volunteers.

Rasa	Pradhana Rasa		Anurasa	
	Volunteers	Percentage	Volunteers	Percentage
Madhura, Amla Lavana, Katu, Kashaya	-	-	-	-
Tikta	30	100%	-	-

**Result:** As per table no 1, 100 % of individuals assessed the taste as Tikta (bitter). After analyzing the data, taste of the drug *Alstonia venenata* R. Br. can be determined as Tikta (bitter)

2. Observation and result of Veerya study

1. Method 1

**Table 2:** Results of *Veerya* (potency) determination by first method

Water Volume	Temperature (in °C) at every 5 minutes for 30 minutes						
	0 min	5 min	10 min	15 min	20 min	25 min	30 min
5 ml	33	30	30	30	30	30	30
10 ml	30	29	29	29	29	29	29
15 ml	30	29	29	29	29	29	29

2. Method 2

**Table 3:** Results of *Veerya* (potency) determination by second method

Drug	Temperature (in °C) at every 5 minutes for 30 minutes						
	0 min	5 min	10 min	15 min	20 min	25 min	30 min
2g	30	29	29	29	29	29	29
4g	30	30	29	29	29	29	29
6g	30	29	29	29	29	29	29

**Result:** Decrease in temperature shows that the *Veerya* (potency) of the drug is Sheeta (cold)

### 3. Observation and result of experimental study on Vipaka

#### 3.1. Food intake

**Table 4:** Effect of test drug *Alstonia venenata* R. Br. stem- bark on food intake with data presented in absolute and relative value:

Group	Food intake in g					
	Preliminary phase		Therapeutic phase		% change	
Control	Absolute value	Relative value	Absolute value	Relative value	Absolute	Relative
		18.07±0.58	9.49±8.63	16.24±0.75 #	8.46±0.75	-
Test	15.87±1.107	8.7 ±0.7	11.88±0.639 ##, **	5.93± 0.26 ##, *	26.8↓	29.9↓

Data: MEAN ± SEM, \*\*P<0.01-compared with control, #P<0.05, ##P<0.01 -compared with preliminary phase.

The data shows that there was decrease in food consumption during the therapeutic phase of *A. venenata* R. Br. compared to the therapeutic phase of control drug, the observed decrease was found to be statistically very significant in absolute value and statistically sig-

nificant in relative value. There was decrease in food consumption during the therapeutic phase of *A. venenata* R. Br. compared to its preliminary phase in both values. The decrease was found to be statistically very significant.

#### 3.2. Water intake

**Table 5:** Effect of test drug *Alstonia venenata* R. Br. stem-bark on water intake with data presented in absolute and relative value:

Group	Water intake in ml					
	Preliminary phase		Therapeutic phase		% change	
Control	Absolute value	Relative value	Absolute value	Relative value		
		20.66±1.11	10.32±0.95	21.16±0.90	10.45±0.57	
Test	31.7± 2.057	17 ±1.578	30.56± 1.612 ***	15.37± 1.435 **	44.42↑	47.08↑

Data: MEAN ± SEM, \*\*P<0.01, \*\*\*P<0.001-compared with control.

The data shows there was increase in water intake during the therapeutic phase of *A. venenata* R. Br. compared to therapeutic phase of control drug, the observed increase was found to be statistically extremely significant in absolute value and statistically very sig-

nificant in relative value. There was decrease in water intake during the therapeutic phase of *A. venenata* R. Br. compared to its preliminary phase in both values, the observed decrease was found to be statistically not significant.

#### 3.3 Urine output

**Table 6:** Effect of test drug *Alstonia venenata* R. Br., stem bark on urine output with data presented in absolute and relative value:

Group	Urine output in ml					
	Preliminary phase		Therapeutic phase		% change	
Control	Absolute value	Relative value	Absolute value	Relative value	Absolute	Relative
		2.01±0.43	2.01±0.43	1.75±0.18 #	0.82±0.10 #	-
Test	7.03± 3.27	2.481± 0.529	3.03± 0.521 *	1.35± 0.21 *	73.14↑	64.63↑

Data: MEAN ± SEM, \*P<0.05-compared with control

The data shows there was increase in urine output during the therapeutic phase of *A. venenata* R. Br. compared to therapeutic phase of control drug in absolute and relative value, the observed increase was found to be statistically significant. There was decrease in urine

output during the therapeutic phase of *A. venenata* R. Br. compared to its preliminary phase in both values, the observed decrease was found to be statistically not significant.

### 3.4. Faecal wet

**Table 7:** Effect of test drug *Alstonia venenata* R. Br. stem- bark on faecal wet with data presented in absolute and relative value:

Group	Faecal wet in g					
	Preliminary phase		Therapeutic phase		% change	
	Absolute value	Relative value	Absolute value	Relative value	Absolute	Relative
Control	4.86±0.26	4.86±0.26	8.06±0.30	3.81±0.11 #	-	
Test	4.97± 0.349	2.73± 0.252	4.84± 0.301 ***	2.09 ±0.11 ***	39.95↓	45.14↓

Data: MEAN ± SEM, \*\*\*P<0.001-compared with control

The data shows there was decrease in faecal wet during the therapeutic phase of *A. venenata* R. Br. compared to therapeutic phase of control drug in both values, the observed decrease was found to be statistically extremely significant. There was decrease in faecal wet during the therapeutic phase of Vishagna- *A. venenata* R. Br. compared to its preliminary phase in both values, the observed decrease was found to be statistically not significant.

### 3.5 Faecal dry

**Table 8:** Effect of test drug *Alstonia venenata* R. Br., stem bark on faecal dry with data presented in absolute and relative value:

Group	Faecal dry in g					
	Preliminary phase		Therapeutic phase		% change	
	Absolute value	Relative value	Absolute value	Relative value	Absolute	Relative
Control	4.31±0.22	2.32±0.19	5.45±0.41	1.93±0.05 #	-	-
Test	4.601± 1.089	1.77 ±0.165	2.7± 0.172 ***	1.3±1 0.066 #,***	34.3↓	32.12↓

Data: MEAN ± SEM, \*\*\*P<0.001-compared with control, #P<0.05-compared with preliminary phase

The data shows there was decrease in faecal dry during the therapeutic phase of *A. venenata* R. Br. compared to therapeutic phase of control drug in both values, the observed decrease was found to be statistically extremely significant. There was decrease in faecal

dry during the therapeutic phase of *A. venenata* R. Br., when compared to its preliminary phase in both values, the observed decrease was found to be statistically not significant in absolute value and statistically significant in relative value

3.6. Food conservation ratio:

**Table 9:** Effect of test drug *Alstonia venenata* R. Br., stem bark on food conservation ratio with data presented in absolute and relative values:

Group	Food conservation ratio					
	Preliminary phase		Therapeutic phase		% change	
	Absolute value	Relative value	Absolute value	Relative value	Absolute	Relative
Control	4.27±0.08	2.11±0.03	3.96±0.15	3.98±0.10	-	-
Test	5.131± 0.168	5.056± 0.21	4.64± 0.122 #, **	4.61± 0.19 *	16.29↑	15.82↑

Data: MEAN ± SEM, \*P<0.05, \*\*P<0.01-compared with control, #P<0.05-compared with preliminary phase.

The data shows there was increase in food conservation ratio during the therapeutic phase of *A. venenata* R. Br. compared to therapeutic phase of control drug, the observed increase was found to be statistically very significant in absolute value and statistically significant in relative value. There was decrease in food

conservation ratio during the therapeutic phase of *A. venenata* R. Br. compared to its preliminary phase, the observed decrease was found to be statistically significant in absolute value and statistically not significant in relative value.

3.7 Faecal water

**Table 10:** Effect of test drug *Alstonia venenata* R. Br., stem bark on faecal water with data presented in absolute and relative value:

Group	Faucal water in ml					
	Preliminary phase		Therapeutic phase		% change	
	Absolute value	Relative value	Absolute value	Relative value	Absolute	Relative
Control	4.71±0.25	4.29±0.09	3.96±0.15	1.92±0.02 #	-	-
Test	1.71±0.147	0.86±0.116	2.11±0.313 ***	0.72±0.059 ***	46.71↓	62.18↓

Data: MEAN ± SE, \*\*\*P<0.001-compared with control

The data shows there was decrease in faecal water during the therapeutic phase of *A. venenata* R. Br. compared to therapeutic phase of control drug in absolute and relative values, the observed decrease was found to be statistically extremely significant. There

was increase in faecal water during the therapeutic phase of *A. venenata* R. Br. compared to its preliminary phase in both values, the observed increase was found to be statistically not significant.

3.8 Body weight

**Table 11:** Effect of test drug *A. venenata. R. Br.* stem bark on body weight of rats:

Group	% change in body weight	%
Control	14.21±2.57	-
Test	4.44±1.7	68.75↓

Data: MEAN ± SEM, \*P<0.05-compared with control: The data shows there was decrease in % change in body weight of Vishagna- *A. venenata. R. Br.* compared to control drug; the observation was found to be statistically significant.

## DISCUSSION

**1. Rasa (taste):** The study - assessment of *Rasa* (taste) through direct perception method by 25 healthy volunteers shows that the drug is of *Tikta Rasa Pradhana* (bitter taste). Study didn't show any *Anurasa* (secondary taste). The opinion of majority was taken into consideration for the assessment.

**2. Veerya (potency)** After assessing the data of study it is clear that there is one degree decrease in the temperature of solution of drug in different volumes and concentrations. It shows the endothermic property of the solution and thus we can assess the *Veerya* (potency) as *Sheetha* (cold).

**3. Vipaka and Guna** (taste after digestion and properties)

**Table 12:** Concluding result of effect of *A. venenata* R. Br. on metabolic parameters of therapeutic absolute and relative phase in Vipaka (potency) study.

Parameters	Absolute	Relative
Food intake, faecal wet, faecal dry and faecal water	SD	SD
Water intake	SI	SI
Urine output	SI	SI
Food conservation ratio	SI	SI
Body weight	SD	

SI- Significant increase

SD- Significant decrease

Agni (digestive fire) plays a major role in determining the pharmacokinetics of a drug as it is the invariable agent in the process of Paka (digestion) Increase in food intake without increase in the food conversion ratio shows *Deepana* (kindles digestive fire) effect. Increase in food conversion ratio shows *pachana* effect, that there is proper absorption. In this study there was significant decrease in food intake and significant increase in food conversion ratio. Apparently, it indicates no *Deepana* (kindles digestive fire) effects but *pachana* (digests *ama*) effect of the drug. The less intake of food can also be attributed to increase in water consumption. There was significant increase in water intake in therapeutic phase of *A. venenata* R. Br., when compared to that of control. The increase may be due to *Tikta* rasa of the drug, as *Tikta* rasa is *Soshakaraka* (causing dryness). Usually increase in water intake indicates *Ushnata* (hot) but here there is increase in urine output also and moreover *Veerya* (potency) study showed drug to be of *Sheetha Veerya* (cold potency). The increase in urine output can be because of increased water intake and vice versa. Faecal wet depends on the food intake and its absorption in the body. There was significant decrease in wet faecal weight, faecal dry and faecal water in therapeutic

phase of *A. venenata* R. Br. compared to the therapeutic phase of control. Increased food and water intake along with decrease in faecal water, wet weight and faecal dry shows proper absorption and less undigested matter in faeces. *Badhamala* (hard stool) indicates *Katu Vipaka* (pungent taste after digestion) and *Ruksha* (dry), *Laghu* (light) *Guna* (qualities). There is significant decrease in body weight in the therapeutic phase of *A. venenata* R. Br., when compared to the therapeutic phase of control. Decrease in body weight may be attributed to the decrease in food intake and also to the increase in food conversion ratio which is indicative of increased metabolism and absorption.

## CONCLUSION

After detail assessment of the studies it is determined that the drug *Alstonia venenata* R. Br. possesses *Tikta Rasa* (bitter taste), *Laghu* (light), *Ruksha* (dry) *Guna* (qualities), *Sheetha Veerya* (cold potency) and *Katu Vipaka* (pungent in taste after digestion). As no specific action which was unexplainable with the above fundamentals was found, no *Prabhava* (specific action) was assessed in the study.

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## ANNEXURE



Fig: 1 *Alstonia venenata* R. Br.



Fig: 2 Veerya study



Fig: 3 metabolic cage in *Vipaka* study

**Source of Support: Nil**

**Conflict of Interest: None Declared**

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