



Research Article

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PHARMACEUTICAL STUDY OF TRINETRA RASA

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ABSTRACT

The efficacy of a medicine depends on many factors, among which preparation technique is of paramount importance. Pharmaceutical study aims at the preparation of the medicine as per the standard operative procedures. Care must be taken throughout the preparation for the incorporation of innate qualities like quick action, lesser dose, tastelessness and prolonged shelf life. Trinetra rasa (Ref: Rasendra sara sangraha) is mentioned as an effective remedy for Mutrakrichra (UTI). It is a mineral preparation with the ingredients Parada (Mercury), Gandhaka (Sulphur) and Vanga bhasma (Ash of Tin). In the present study, detailed description regarding the pharmaceutical procedure of Trinetra rasa has been discussed. It includes samanya shodhana (general purification) and vishesha shodhana (specific purification) of the ingredients. Jarana and marana of Vanga, Bhudhara yantra sthapana vidhi, bhavana vidhi etc. were done as per classical reference. The intermediate process, Bhudhara yantra sthapana vidhi was done as per expert guidance and the observations were recorded systematically. A very detailed representation of the temperature variations of the processes etc. are furnished here.

Key words: Trinetra rasa, Jarana, Marana, Bhudhara yantra

INTRODUCTION

With the invention of Microscopes, the existence of microbes was exposed and this has led to the development of many antibiotics which helped in destroying the disease causing microbes to a considerable extent. The clinical efficacy of many antibiotics is threatened by emergence of multi drug resistant pathogens and this antibiotic resistance along with its side effect and adverse drug reaction are also factors of global concern. These difficulties put forward the need for development of newer antimicrobial agents that are safe and economical to the patients.

Trinetra rasa has been described as a drug of choice in UTI and is assumed to have antibacterial activity. Its ingredients are Parada, Gandhaka and Vanga bhasma. Parada and Gandhaka have bactericidal activity and Vanga bhasma has specific action on Urinary tract diseases. In this study, the pharmaceutical procedures adopted in preparation of Trinetra rasa has been explained i.e. Shodhana, Jarana, Marana, Bhavana, etc. In this study, a rare pharmaceutical procedure called Bhudhara yantra sthapana vidhi was done as an intermediate process between bhavana vidhi.

MATERIALS AND METHODS

Table 1: Ingredients and Bhavana dravya

Ingredients And Quantity	Bhavana dravya
1. Shudha Parada (Mercury) - 100 gm	Durva Swarasa,
2. Shudha Gandhaka(Sulphur) -100 gm	Yashtimadhu
3. Vanga bhasma (Ash of tin) - 100gm	Kashaya Gokshura Kashaya, Salmali Kashaya

Table 2: List of procedures involved

Sl. no	Name of procedures
1	Parada Shodhana
2	Gandhaka Shodhana
3	Kajjali Nirmana
4	Vanga Shodhana
5	Vanga Jarana
6	Vanga Marana
7	Mardana of Kajjali and Vanga bhasma
8	Bhavana in Kashayas (1 st time)
9	Sthapana in Bhudhara yantra
10	Bhavana in Kashayas (2 nd time) and drying

Parada Samanya Shodhana

Equipment: Khalwa yantra, Spatula, Steel vessel, Cloth etc.²

Table 3: Ingredients of Parada Samanya Shodhana

Sl.no	Ingredient	Quantity
1	Ashudha Parada	250 g
2	Sudha curna	250 g
3	Lasuna	200 g
4	Saindhava lavana	200 g
5	Warm water	Q.S

Gandhaka Shodhana

Equipments: Khalwa yantra, heating apparatus, Iron pan, Spatula, Steel vessel, Cloth etc.

Method: Dhalana³

Table 4: Gandhaka samanya shodhana

Sl.no	Ingredient	Quantity
1	Ashudha Gandhaka	250 g
2	Godugdha (Cow's milk)	500 ml x 7 times = 3500 ml
3	Goghṛta (Cow's Ghee)	25 mg x 7 times = 175g
4	Warm water	Q.S

Kajjali nirmaṇa

Equipment: Khalwa yantra, spatula

Method: Mardana⁴

Table 5: Kajjali nirmaṇa

Sl.no	Ingredient	Quantity
1	Shudha Parada	120g
2	Shudha Gandhaka	120g

Samanya and Vishesh shodhana of Vanga

Equipment: Coal stove, iron ladle, iron rod, Pitara yantra, vessels, spatula, measuring cylinder, weighing machine, pyrometer etc.

Method: Dhalana (Melting and pouring)⁵.

Table 6: Ingredients used in Vanga Samanya Shodhana

Sl.no	Name of the ingredients	Quantity
1	Ashudha Vanga	450 g
2	Tila taila (Gingili oil)	2 Litre
3	Takra (Butter milk)	2 Litre
4	Gomutra (Cows urine)	2 Litre
5	Kañji	2 Litre
6	Kulatha Kwatha (Horse gram)	2 Litre

Preparation of Takra

Method: Manthana (Churning)

Duration: 2 h

Equipment: Two stainless steel vessels, churner, mixer, measuring jar, clothes, weighing machine etc.

Ingredients: Curd = 1.35 l and D.M. Water = 666 ml

Preparation of Kañji

Method: Sandhana (fermentation)

Duration: 30 days

Equipment: Gas stove, lighter, stainless steel vessel (2), spatula, mortar and pestle, measuring mug, cloth and porcelain jar, mud smeared cloth etc.⁶

Table 7: Ingredients of Kañji

Sl.No	Ingredients	Quantity
1.	Rice	0.5 Kg
2.	Saindhava Lavaṇa (NaCl)	0.5 Kg
3.	Masha Vataka	0.125Kg
4.	Sarsapa (Mustard)	0.25Kg
5.	Haridra Curṇa (Turmeric)	0.125 Kg
6.	Vamsa Patra (Bamboo leaves)	0.125Kg
7.	Jeeraka Curṇa (Cumin seeds)	0.05Kg
8.	Shunti Curṇa (Ginger)	0.05Kg
9.	Shoditha Hingu (Asafoetida)	0.025Kg
10.	Sarsapa taila (Mustard oil)	0.11L
11.	Kulatha Kwatha (Horse gram)	1L
12.	Water	5L

Preparation of Kulattha Kwatha (*Dolichos biflorus* Linn)

Principle : Kwathanath (boiling)

Duration : 2 h 15 min

Equipment: Gas stove, lighter, stainless steel vessel (2), measuring mug, clothes, spatula and weighing machine etc.

Ingredients: Kulattha: 2 kg and D.M. Water: 8 l.

Viseṣha Shodhana of Vanga

Preparation of Sudha jala (CaCO₃)

Principle: Nimajjanam

Duration: 12 h

Equipments: Stainless steel vessel, measuring jar, clothes, spatula and weighing machine etc.

Ingredients: Sudha curṇa

D.M. Water: 2.5 l

Method: Dhalana

Media: Sudha jala.

Equipments: Coal stove, iron ladle, iron rod, Pitara yantra, stainless steel vessels, spatula, measuring cylinder, weighing machine, pyrometer etc.⁷

Jarana of Shudha Vanga

Method: Aavapa

Ingredient: Shudha Vanga - 250 g

Media: Apamarga Pancaṅga curṇa – 75g

Duration: 5 h

Equipments: Iron pan, iron ladle, coal stove, weighing machine, Sarava, Pyrometer etc.⁸

Procedure

- Shudha Vanga (250 g) is melted in an open Lauha darvi. Apamarga panchanga ranging from 5g to 10 g was added frequently with continuous stirring & rubbing. The process is repeated till the whole metal is converted into powder form. This powder is heaped up in the center of the Lauha Kadhai, covered with a Sarava and heat was increased up to maximum (Tivragni)
- Intermittently Sarava was slightly lifted to check the color of the powder. When the color changes in to red hot & no melted particles of free metal was observed the heating was stopped and left for self-cooling.
- Next day, Jarita vanga was collected and weighed.

Vanga Marana by using Gaja Puta

Method: Putapaka

Equipments: Khalwa yantra (stone made), Gaja puta pits, Cow dung cakes, Weighing machine, measuring jar, knife, spoon, mud smeared clothes, Stainless steel vessel, pyrometer⁹

Ingredients

- Jarita vanga 250 g
- Bhavana dravya (Kumari swarasa 100 ml in each Bhavana)

Chakrika nirmaṇa and Samputikarana

- Jarita Vanga along Kumari swarasa was levigated in Khalwa yantra until it formed a thick paste suitable for making Chakrika (max: 3 h) and dried
- Measurement of one Chakrika Diameter: 2 - 2.5 cm, Thickness : 0.5 cm to 0.7 cm, Weight: 8 - 10 g

Putapaka

- Gaja puta: 30 Angulas = 57 cm in length, breadth & height.
- 2/3rd part of the pit for Gajaputa was filled with cow dung cakes and Sarava saṁputa was kept in the centre. Remaining 1/3rd part was again filled with cow dung cakes to cover the Sarava saṁputa and ignited from the top. After complete burning it was allowed to self-cool and next day the saṁputa was taken out and the material was procured.
- Thus collected material was grounded & again these processes were repeated for another 6 times.

Measurement of Temperature

A hole is drilled from the side wall of classical Puta for inserting thermocouple rod of the pyrometer, in such a way that its tip reaches at the surface of the Sarava saṁputa and thermocouple inserted into it before filling 1/3rd portion of the pit. Pyrometer reading is taken right from atmospheric temperature.

Mardana of Kajjali and Vanga bhasma

Method: Mardana

Equipments: Weighing machine, khalwa yantra, spoon, sarava

Ingredients: Kajjali- 200 g and Vanga bhasma - 100 g

Procedure

- Previously Prepared Kajjali was accurately weighed then added 100 g of vanga bhasma and triturated well.
- Trituration was continued till the powder became black in color and very fine.

Bhavana with Swarasa and Kashayas (for 1st Bhavana)

Apparatus: Weighing machine, khalwa yantra, spoon

Table 8: Ingredients and quantity for Bhavana dravya

Ingredients	Quantity	No of Bhavana	Days
Durva swarasa	200 ml	1 st Bhavana	1 st day
Gokshura Kashaya	200 ml	2 nd Bhavana	2 nd day
Yashtimadhu Kashaya	200 ml	3 rd Bhavana	3 rd day
Salmali Kashaya	200 ml	4 th Bhavana	4 th day

Sthapana in Bhudhara yantra

Method: Putapaka

Equipments: Sarava (2), Bhudhara yantra pits, Cow dung cakes, Weighing machine, mud smeared clothes, Stainless steel vessel, pyrometer¹⁰.

Procedure

- A pit was dug on the earth of 45cm length, breadth and height. The Sarava was kept in center of the pit, leaving 2 inches space from top bottom and all the sides and these spaces were filled with sand. And the outer borders were arranged with bricks.
- Cow dung cakes were placed over the sand then karpura and ghee smeared clothes were kept on the side and the base of

the pit of the Puta and ignite from the base and lit it properly.

Measurement of Temperature

Temperature was recorded at each 30 minute, right from the putting of ignited cow dung cakes to the self-cooling of Puta.

Bhavana with Swarasa and Kashayas (for 2nd Bhavana)

Same as the above mentioned bhavana procedure.

OBSERVATIONS

Table 9: Properties of Various liquid media used for Shodhana of Vanga

Liquid media	Color	Taste	Smell	pH
Takra(2L)	White	Sour	Milky	3.5
Kañji*(2.5L)	Yellowish	Sour	Obnoxious	4.8
Kulattha Kwatha(2L)	Brownish	Astringent	No specific smell	6.66
Sudha jala(2L)	Pale white	-	No specific smell	6.66

*Kañji-Initially pH was observed as 7.0 however after completion of the fermentation process it went to 4.8 i.e. highly acidic.

Observations: Vanga Marana

- After 1st Bhavana increase in weight of Jarita Vanga was noticed, which was slightly decreased after Puta But afterwards it remains steady.
- When Puta no: increase, hardness of chakrika was observed more and also the color of chakrika increases to darker.
- Varitaratva was passed after 5th and 6th Puta respectively.
- The peak temperature was observed 1019°C, at 1 h 10 min after ignition of Puta, Above 800°C temperature is maintained for 50 ± 5 min & Above 600°C temp is maintained for 1 h 25 ± 5 min also self-cooling time duration was found 8 hours.

Observations: Bhudhara yantra sthapana vidhi

- When the sarava was opened after the procedure, the finished product appeared like solid mass.
- The peak temperature was observed 395°C, at 1 hour after ignition of Puta, Above 200°C temp is maintained for 50 ± 5 min & Above 100°C temp is maintained for 1 hour also self-cooling time duration was found 6 hrs.

Observations: Mardana of Kajjali and Jarita vanga

- After 30 min of trituration, the color of Vanga bhasma completely turned in to black (Kajjali sadrisya).
- Fulfilled the Varitaratva and Rekhapurnatva pareeksha.
- The entire powder became fine, black, smooth, lusterless and Kajjali bhava.

RESULTS

Table 10: Results of Samanya shodhana of ingredients and Kajjali nirmana

Procedures	Total time required	Weight after Shodhana	Weight loss
Parada shodhana	24 days	200g	50g
Gandhaka shodhana	7days (4 hours)	220g	30g
Kajjali nirmana	72 hours	220 g	20 g

Table 11: Results of Vanga Samanya Shodhana

Sl.No	Liquid media used	Processing stage	Weight of Vanga (g)	Melting point(°C)	Initial temp of Media(°C)	Total duration (h:min)
1	Tila taila	Before	450	232	34	06:40
		After	440			
2	Takra	Before	440	232	30	06:45
		After	400			
3	Gomutra	Before	400	231.9	32	05:15
		After	372			
4	Kanji	Before	372	230	30	06:45
		After	338			
5	Kulatha Kwata	Before	338	228	34	05:15
		After	289			

Table 12: Results of Vishesa Shodhana of Vanga

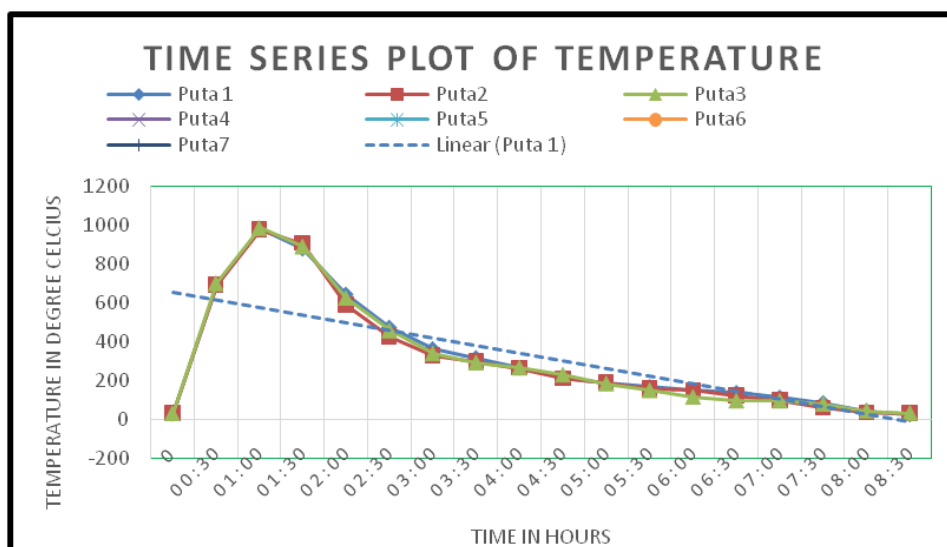
Liquid media	Process stage	Weight of Vanga (g)	Melting point (°C)	Initial temp: of Media	Total duration
Sudha jala	Before	289	225	30	03:00
	After	262			

Vanga Jarana

Quantity of Shudha Vanga: 250 g
Jarita Vanga obtained after Jarana: 268 g

Table 13: Results of Vanga marana

No. of Gaja Puta	Wt. of Jarita/Marita Vanga (g)	No. of cow dung cakes	CAKRIKA		
			Before Puta (Wt in g)	After Puta	
				Colour	Consistency
1 st	250	100	256	Creamy white	Firm
2 nd	252	100	252	Creamy white	Firm
3 rd	250	100	250	Creamy white	Hard
4 th	238	100	235	Creamy white	Hard
5 th	235	100	235	Creamy	Hard
6 th	235	100	234	Creamy	Hard
7 th	234	100	234	Creamy	Hard



Graph 1: Temperature variations of all the seven putas vs time

Table 14: Time v/s Temperature

Time	Putra 1	Putra 2	Putra 3	Putra 4	Putra 5	Putra 6	Putra 7
0	32	33	35	36	38	41	32
00:30	690	693	702	696	698	708	699
01:00	1019	979	1015	982	984	1019	1012
01:30	880	907	891	910	912	897	888
02:00	645	592	627	595	597	633	624
02:30	475	427	460	430	432	466	457
03:00	365	332	342	335	337	348	339
03:30	319	301	296	304	306	302	293
04:00	268	266	270	269	271	276	267
04:30	215	212	233	215	217	239	230
05:00	190	191	188	194	196	194	185
05:30	170	162	153	165	167	159	150
06:00	155	152	120	155	157	126	117
06:30	140	126	100	129	131	106	97
07:00	116	102	100	105	107	106	97
07:30	88	62	84	65	67	90	81
08:00	47	37	50	40	42	56	47
08:30	28	34	38	37	39	44	35

Mardana of Kajjali and Jarita vanga

- Initial Weight of Kajjali :200 g
- Initial Weight of Vanga bhasma :100 g
- Total no of hours taken for Mardana :3 h
- Finished product obtained after Mardana :297 g
- Weight loss :3 g

Table 15: Results of Kashaya preparation for Bhavana

Sl. no	Ingredients	Quantity	Jala pramana (Ratio of Water-8 times)	Reduced to 1/8	Days/ no of Bhavana
1	Gokshura	200 g	1600 ml	200 ml	2 nd day/ 2 nd Bhavana
2	Yashtimadhu	200 g	1600 ml	200 ml	3 rd day/ 3 rd Bhavana
3	Salmali	200 g	1600 ml	200 ml	4 th day/ 4 th Bhavana

Bhudhara yantra sthapana vidhi

- Quantity of drug before procedure : 300g
- Quantity of drug before procedure : 300 g
- No. of Upalas (cow dung cakes) used : 170
- Duration : 3 h
- Peak temperature observed : 395°C

Finished product

- Quantity of ingredients taken: 300 g
- Quantity of **Trinetra rasa** obtained after all the procedure: 295 g

DISCUSSION

Trinetra Rasa of Rasendra sara sangraha has been described as a drug of choice in 'Mutrakṛchra'. Its mineral ingredients are Parada, Gandhaka and Vanga bhasma. First Kajjali was prepared and then Vanga bhasma was added to it. To this mixture Durva swarasa, Yashtimadhu Kwatha, Gokshura Kwatha and Salmali Kwatha were added and triturated respectively with each for one day. The mixture was filled in a musha and processed in Bhudhara yantra. Material was collected and Bhavana was repeated with the above-mentioned liquid media and medicine was prepared.

Parada shodhana was done as per Rasatarangini reference Gandhaka shodhana was done by Dhalana method using Godugdha as medium. Sulphur melts at temperature of 118°C. Guru, Śnigdha Guṇa and Sita Virya of Godugdha pacifies the

Tikṣna, Usṇa guṇa of Gandhaka. Otherwise it causes Bhrama, Tapa, Kushta, Pitta roga. After filtering, fine sandy particles were seen on cloth which indicates removal of Sila Curṇa doṣa as said in classics. 250 g of Ashudha Gandhaka was taken for shodhana. After the procedure, a loss of 30 g was observed. This loss may be due to the adherence of Gandhaka to the cloth and removal of Pashaṇa and Visha doshas.

For Jarana 1/4th part of Apamarga kshara was taken (75g). It took 5 hours for the Jarana of 250 g of vanga. In final stage, the temperature of fry pan and temperature of Jarita vanga was found 680°C & 630°C respectively. Vanga Marana is different from Marana of other Shudha Lohas & Misra lohas. Shudha lohas can be subjected to Putapaka in the form of thin leaves, fine powders or amalgams because it has higher melting point, the least being 960° C of silver so they can be easily subjected to Gaja Puta which comes up to the temperature 900°C to 1000°C so the Putilohas cannot be subjected to Puta in their metallic form because of their low melting point that is 232°C & 325°C for Naga & Vanga respectively and the temperature of even Laghu Puta comes up to 800°C. Hence a preparatory method that is Jarana was mentioned in classics to convert the Puti lohas into its powder form which is more stable on fire. Though these Jarana processes are considered as a complete Marana process and the resultant powders are used for therapeutic purposes, but in most of texts this Jarita Vanga is further subjected to suitable Bhavana & Puta and then used as medicine. It is proved in previous study that there is free metal in Jarita Vanga so it should be subjected for Puta. After Jarana, marana is mentioned. For marana of Vanga Gajaputa was selected as per the reference of Ayurveda prakasha. Vanga Bhasma Varna is said to be

Subhratvamayati and Sankhakundendudhavalam by Rasatarangini. But in fact, it may vary depending upon the media used for Jarana. Bhasma passes all the Bhasma pariksha as per classics i.e. Varitaratwa- (Floating on water), Niruthatva- (non-returning into original metal state), Apunarbhavatva- (Incapable of regaining its original form).

Bhavana of Trinetra rasa was done in two stages first when Vanga bhasma is mixed with Kajjali and triturate with Durva swarasa, Yashti Kwatha, Gokshura Kwatha and Salmali Kwatha then 2nd after Bhudhara yantra sthapana vidhi. In this selection of Bhavana dravya enhances the therapeutic efficacy of the preparation because all the mentioned Drava dravyas for Bhavana are Madhura rasa and Sita virya pradhana. In case of Trinetra rasa multiple Bhavana dravyas may exhibit multitude of therapeutic benefits by the Hormesis principle. There is no direct description about the dimensions of Bhudhara yantra or regarding the intensity of heat or duration of heat supply. It was mentioned as an intermediate process between two Bhavanas in this yoga. In this study Bhudhara Yantra was set up as per the expert advice.

CONCLUSION

Trinetra Rasa mentioned in the classical text Rasendra sara sangraha was taken as the reference for the preparation. It is not a widely used preparation nowadays. The purpose of the study was to find out the standardised procedure for the preparation of Trinetra rasa. In this study Samanya Visesha Shodhana, Jarana, Marana and Murchana vidhi were done as per classical reference. The intermediate process Bhudhara yantra sthapana vidhi was done as per expert guidance and the observations were recorded systematically.

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