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A COMPARATIVE PHARMACEUTICAL STUDY OF DWIGUNAKHYA RASA AND TRIGUNA RASA

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ABSTRACTS

Dwigunakhya Rasa and *Triguna Rasa* are the unique herbo-mineral formulations which are explained in the text book *Rasendra Sara Samgraha* and *Sahasrayoga* respectively which are mainly indicated in the context of *Kampavata* (Parkinson's disease).. Both formulations include same ingredients with different proportions. The ingredients are *Hingulottha Parada*, *Shodhita Gandhaka* and *Haritaki Choorna.* **Objectives:** To prepare *Dwigunakhya Rasa* and *Triguna Rasa* as per the classical methods. **Materials and methods:** *Shodhana* of *Hingula,* preparation of *Hingulottha Parada, Shodhana* of *Gandhaka,* preparation of *Kajjalies* for *Dwigunakhya Rasa & Triguna Rasa* and preparation of final product of *Dwigunakhya Rasa & Triguna Rasa* were carried out. **Results and Discussion:** The yield of *Hingula* and *Gandhaka* after *Shodhana* were 99% and 72% respectively. The yield of *Hingulottha Parada* was 70.8%. 78g of *Dwigunakhya Rasa* and 146g of *Triguna Rasa* were obtained as final product. **Conclusion:** From pharmaceutical study, it revealed that preparation of *Triguna Rasa* is comparatively easier.

KEYWORDS: *Hingulottha Parada, Gandhaka, Kajjali, Dwigunakhya Rasa, Triguna Rasa.*

INTRODUCTION

Rasaoushadhies play an important role in Ayurvedic therapeutics which contains various Herbo- mineral formulations. Due to its innate qualities such as quick action, lesser dose, better palatability and prolonged shelf life,[1] it helps to fulfil the demand of patients as well

as pharmaceutical proprietors. In *Rasashastra*, different unique preparations such as *Kharaleeya Rasayana, Parpati, Pottali* and *Kupipakwa Rasayanas* are mentioned which are very effective in curing the different diseases including chronic diseases too. *Dwigunakhya Rasa*[2] *and Triguna Rasa*[3] are the unique herbo-mineral preparations which are explained in the books of *Rasendra Sara Samgraha* and *Sahasrayoga* respectively and are indicated in *Kampavata.* Thus, the present study, *Dwigunakhya Rasa* and *Triguna Rasa* were taken to evaluate and compare its pharmaceutical study.

AIMS AND OBJECTIVES

1. Pharmaceutical study of *Dwigunakhya Rasa.*
2. Pharmaceutical study of *Triguna Rasa*.
3. To compare the pharmaceutical studies of *Dwigunakhya Rasa* and *Triguna Rasa*.

MATERIALS AND METHODS

Methods:

- *Shodhana* of *Hingula* by 7 times *Nimbu Swarasa Bhavana.*[4]
- Extraction of *Parada* from *Hingula* by *Urddhwa Patana* method.[5]
- *Gandhaka Shodhana* in *Godugdha.*[6]
- *Kajjali* preparation for *Dwigunakhya Rasa.*
- *Kajjali* preparation for *Triguna Rasa.*
- Preparation of *Dwigunakhya Rasa.*
- Preparation of *Triguna Rasa.*

Pharmaceutical source: Samples of *Gandhaka* was collected from Department of PG studies in *Rasashastra* and *Bhaishajya Kalpana* of Alva's Ayurveda Medical College by considering the *Grahya Lakshanas.* Samples of *Hingula* was collected from Shree Dootapapeshwar Pvt. Ltd, Mumbai and *Haritaki* was collected from Alva's Pharmacy, Mijar and which was authentified as *Terminalia chebula* Retz. by experts of ATMA Research Centre, Alva's Ayurveda Medical College, Moodubidire. Necessary *Shodhana* of *Gandhaka* and *Hingula, Parada* extraction from *Hingula* and preparation of *Dwigunakhya Rasa* and *Triguna Rasa* were done in the laboratory of Department of PG studies in *Rasashastra* and *Bhaishajya Kalpana*, Alva's Ayurveda Medical College, Moodubidire.

Hingula shodhana

Equipments: *Khalwa Yantra*, juice extractor, knife, small spoon.

Method: *Ashodhita Hingula* was taken in a cleaned and dried *Khalwa Yantra* and it was made into fine powder form. Then, sufficient quantity of *Nimbu Swarasa* was added to powdered *Hingula* and triturated uniformly until it reached *Bhavana Siddhi Lakshana*. This procedure was repeated for 7 times (Table No.1 & 2).

***Hingulottha parada* preparation**

Equipments: *Khalwa Yantra*, Juice extractor, knife, small spatula, mud pots, kora cloth, *Urddhwa Patana Yantra,* Multani Mitti, gas stove, vessels etc.

Method: Fine powder of *Shodhita Hingula* was placed inside the earthen pot uniformly. Then another large sized earthen pot of same size was fixed over the first pot invertedly. S*andhibandhana* near the junction of 2 pots was done. After that, an earthen pot with broken base portion was taken and 2 holes were made on sides of same pot. Its mouth portion was fixed over the upper earthen pot and sealed. Then 2 pipes (equal diameter with 1 meter length) were fixed through 2 holes and it was kept for drying. After that, *Urdhwapatana Yantra* was kept over gas stove. Distal end of one plastic pipe was fixed to flowing water source and distal end of second pipe was kept in sink for draining water from pot. It was helped to keep the upper pot cool with uniform temperature throughout the procedure. 2 hours, 3 hours and 4 hours were given for *Mrdu Agni*, *Madhyama Agni* and *Teevra Agni* respectively. Then it was kept for *Swanga Sheeta*. On the next day, *Sandhibandhana* was removed carefully and black coloured soot with mercury globules were collected from the upper pot by scrapping. Then it was filtered through double fold cloth to get mercury separately and stored. (Table No.3)

Gandhaka shodhana

Equipments: *Darvi Yantra, Dola Yantra,* vessels, spoons, spatula, hot water, kora cloth

Principle: *Dhalana* and *Swedana*

Method: A clean big table spoon of stainless-steel (*Darvi Yantra*) was taken and desired quantity of *Goghrita* (equal quantity or minimum of $1/4^{th}$ quantity of *Gandhaka*) was taken in it and held over mild fire. When ghee got melt, the same quantity of powdered *Ashodhita Gandhaka* was added into it. As the sulphur started to melt, the mixture was stirred continuously with a spoon. When sulphur melted completely, it was carefully poured into the vessel containing milk through the cloth. For better purification, in this study, above procedure was repeated 7 times using fresh milk each time. Then, *Gandhaka* was collected and washed with hot water. Then *Gandhaka* was subjected to *Swedana* (*Dola Yantra* method)

for one *Ghati* (1 hour). Later, it was washed with hot water and it was kept for drying. (Table No. 4)

Kajjali preparation of dwigunakhya Rasa & Triguna rasa

Equipments: *Khalwa Yantra*, spoon, weighing machine

Method: In both formulations, *Hingulottha Parada* was taken in *Khalwa Yantra* and finely powdered *Shodhita Gandhaka* was added to it and triturated in separate *Khalwayantra*. Triturating was done until it attains *Kajjali Lakshanas* **(**Table No. 5**)**.

Preparation of *dwigunakhya Rasa & Triguna rasa*

Equipments: *Khalwa Yantra*, spoon, weighing machine

Method: The same method of preparation is mentioned for *Dwigunakhya Rasa* and *Triguna Rasa.* Here, prepared *Kajjali* was taken in *Ghritalipta Darvi* and was melted over *Mandagni*. Then it was poured on cooled surface for better and fast cooling. Then after cooling, total obtained melted *Kajjali* was measured and was added to *Khalwa Yantra*. Then equal amount of *Sukshma Churna* of *Haritaki* was added into it and then it was mixed well to get homogenous mixture. Then it was stored in an air tight container (Table No. 5).

OBSERVATION AND RESULTS

- *Hingula* obtained after *Shodhana* – 99%
- *Hingulottha Parada* obtained – 70.8%
- *Gandhaka* obtained after *Shodhana* – 72%
- Total quantity of *Dwigunakhya Rasa* obtained – 78g
- Total quantity of *Triguna Rasa* obtained – 146g

DISCUSSION

- ***Dwigunakhya Rasa* and *Triguna rasa*** are mentioned in *Rasendra Sara Samgraha* and *Sahasrayoga* respectively in the context of *Kampavata.* Similar method of preparation with same ingredients are mentioned in both formulations. But, the ratios between ingredients are different.
- ***Hingula*** is a chief ore of mercury. ***Hingulottha Parada*** (mercury extracted from *Hingula*) is having equal property of *Gandhaka Jarita Parada* and *Ashtasamskarita Parada*. It is devoid of *Parada Doshas* too. Various methods have been employed for the extraction of *Parada* from *Hingula*. *Urdhwapatana Vidhi, Adhahpatana Vidhi,*

Tiryakpatana Vidhi and *Nadayantra Vidhi* etc are the classical methods for extraction of *Parada* from *Hingula.*

- ***Gandhaka*** is one of the Uparasa and it is an essential ingredient for various processes such as *Murcchana, Marana, Jarana & Bandhana* etc. Mercurial Preparations without Gandhaka are considered to be more toxic.
- ***Haritaki*** (*Terminalia chebula* Retz.) is a very auspicious drug which is effective in different diseases.

Discussion on pharmaceutical study

- ***Hingula Shodhana*** was done by 7 times *Bhavana* with *Nimbu Swarasa*. As increasing the times of *Bhavana*, duration of *Bhavana* and force applied for *Bhavana* were reduced and particle size of *Hingula* might be reduced also. The qualities of *Nimbu Swarasa* might be added to *Hingula* by subsequent *Bhavana.* Colour of the *Hingula* was changed from thick red to light red and luster was reduced to dull. It may due to continuous exposure of friction on trituration and *Nimbu Swarasa.*
- ***Gandhaka Shodhana*** was done by combination of *Dhalana & Swedana* methods using *Godugdha* as medium. Molten Sulphur was collected into milk as solidified crystalline sulphur. Physical impurities like mud, stone etc were remained on cloth. *Guru Snigdha Guna and Sheeta Virya* of *Godugdha* pacifies the *Tikshna, Ushna Guna* of *Gandhaka*. Otherwise, it causes *Bhrama, Tapa, Kushta, Pitta Roga*.
- ***Hingulottha Parada*** preparation was done by *Urdhwa Patana* method. *Hingula* was taken in lower pot and *Parada* was collected from upper pot after the procedure. *Choorna* form of *Shodhita Hingula* was taken and spread in lower pot of *Urdhwa Patana Yantra*. 2 hrs. of *Mandagni*, 3 hrs. of *Madhyamagni* & 4 hrs. of *Teekshnagni* were adopted for durations of quantum of heat. This might be one of the reasons for dissociation of more *Parada* from *Hingula*. Because this would be helped to avoid charring and incomplete *Pachana* of *Hingula* into *Sara & Kitta.* When *Hingula* situated in lower pot gets the high temperature, there might be breaking of the bond between Hg and S and also there might be release of gas like SO_2 too. Impurities like *Naga, Vanga* etc., having high BP, hence those didn't sublimate and might be remained at the bottom of the lower pot. This might be the reason that, *Hingulottha Parada* is devoid of *Kanchuka Doshas*. The blackish pale yellow coloured soot might be due to unoxidized carbon formed by the constituents of *Nimbu Swarasa*. Probable chemical reactions may be as follows:

HgS + Organic acids (oxidation of sulphur, heating in closed condition) → Hg + SO_2 + CO_2 + C + H_2O

$2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$ → on further heating, $2HgO \leftrightarrow 2Hg + O_2$

- ***Dwigunakhya Rasa & Triguna Rasa Kajjali*** preparation were completed in 77 hours and 32 hours of *Mardana* respectively. Black colour of *Kajjali* might be due to formation of black sulphide of mercury. Mercurial has a great attraction to the sulfhydryl or thiols. The mercury atom or molecule will tend to bind with any molecule present that has sulfur or a sulfur-hydrogen combination in its structure. This process of combining with a metal to form a complex in which the metallic ion is sequestered and firmly bound is called chelation.
- 78g of ***Dwigunakhya Rasa*** and 146g ***Triguna Rasa*** were obtained as final product after whole procedure. Only small amounts of *Kajjali* were taken for procedure of each melting. Proper *Paka* and *Paka Lakshanas* are not mentioned in the references of both formulations. So, here in this study, *Parpati Paka* was adopted. But as *Parpati Kalpana*, *Patras* (leaves) like *Kadali Patra* etc., were not used in this study. Because it might be facilitating the transfer of active ingredients of *Kadali Patra* to melted *Kajjali* and it might be altering the original property of the final product. *Goghrita* in *Ghritalipta Darvi* prevents the sticking of the melted *Kajjali* to the *Darvi*. Also, it might be helping easy digestion and acting as anti-oxidant too. Presence of *Ghrita* in final product may help in *Mastishkajanya* diseases. So, it may be very effective in *Kampavata*. Throughout procedure, *Mandagni* should be maintained to avoid attainment of *Khara Paka* which is therapeutically unfit. By melting (i.e., by *Agni Samskara*), the preparation might be having property of *Laghutwa* (lightness) and it might be digesting and assimilating easily.

Tables included

Table no. 1: Showing the quantity of *hingula* for *shodhana.*

Ashodhita Hingula	**Number of *Bhavana***	***Nimbu Swarasa***	**Time for *Bhavana***	***Shodhita Hingula***	**Loss**
520g	1st *Bhavana*	70ml	6hr	515g (99% obtained)	5g (1% loss)
	2nd *Bhavana*	60ml	5hr		
	3rd Bhavana	50ml	5hr		
	4th Bhavana	50ml	5hr		
	5th Bhavana	40ml	4hr		
	6th Bhavana	30ml	5hr		
	7th Bhavana	30ml	5hr		

Table no. 2: Showing the observations During and After *hingula shodhana*.

Sl. No.	Characters	Before *Hingula Shodhana*	After *Shodhana*
1	Colour	Dark red mixed bright red colour with silvery line in between	Bright red
2	Appearance	Shining appearance with some sharp edges and heavy	Shining lost, dry powder form
3	Touch	Heavy, rough	Smooth
4	Smell	No characteristic smell	Smell of *Nimbu*
5	Taste	Not tasted	Not tasted

Table no. 3: Showing the yield of *hingulottha parada.*

Procedure	Quantity	Appearance
Shuddha Hingula was taken initially	250g	Bright Red coloured powder
Soot and mercury globules in upper pot after procedure	220g	Dark black coloured soot with silver coloured mercury globules
Shodhita Hingula was left in lower pot	9g	Pale yellow coloured powder
Parada was extracted from *Hingula*	177g	Heavy and silvery white coloured liquid
Expected percentage of gain	86.2%	
Hingulottha Parada obtained	70.8%	
Loss from expected percentage	15.4%	

Table no. 4: Showing the changes after *gandhaka shodhana.*

Features	**Before *Shodhana***	**After *Shodhana*** / **After 7th *Dhalana***
Smell of milk	Smell of milk	Pleasant smell of sulphur
Colour of milk	White	Light yellow
Colour of *Gandhaka*	light greenish yellow with shining	Bright Yellow
Smell of *Gandhaka*	Pungent Sulphur smell	Pleasant smell of sulphur and slight smell of milk and ghee.
Appearance of *Gandhaka* after 7th *Dhalana*		Solidified sulphur with irregular forms like small granular and streaks which were floated over milk. Large pieces were fully immersed in milk. Soft with disappearance of crystal appearance & shining after drying.
Gandhaka* obtained after 7th *Dhalana		180g
***Swedana* procedure:**		
Gandhaka* taken for *Swedana	**Before *Swedana***	**After *Swedana***
	180g	180g
Obtained *Gandhaka* after whole procedure – 72%		

Table no. 5: Showing the comparative pharmaceutical study of *dwigunakhya Rasa* & *Triguna rasa.*

Observations	***Dwigunakhya Rasa***	***Triguna Rasa***
Quantity taken for *Kajjali* preparation	30g of *Hingulottha Parada* and 15g of *Shodhita Gandhaka*	10g of *Hingulottha Parada* and 80g of *Shodhita Gandhaka*
Time taken for *Kajjali Mardana*	77 hrs.	32 hrs.
Rekhapurnatwa Pareeksha	Passed at 45th hr.	Passed at 20th hr.
Varitaratwa Pareeksha	Passed at 42nd hr.	Passed at 25th hr.
Nischandratwa Pareeksha	Passed at 70th hrs.	Passed at 32nd hr.
Kajjali after *Siddhilakshana*	41g	88g
Obtained *Kajjali*	91%	97%
Kajjali after melting	39g	73g
Average time taken for each melting of 2g *Kajjali*	35 sec.	29 sec.
Observations on melted *Kajjali* after cool down	Semi solid texture	Thin flakes with smooth surface as *Parpati*
Haritaki was added	39g	73g
Mardana after adding the *Haritaki*	3 hours	3 hours
Yield of final product	78g	146g

Pictures of preparation of *dwigunakhya rasa* and *triguna rasa*:

1) *Hingula Shodhana:*

Raw *Hingula* | Pouring of *Nimbu Swarasa* | *Bhavana* with *Nimbu Swarasa* | *Shodhita Hingula* (after 7th *Bhavana*)

2) *Hingulottha Parada:*

Urdhwa Patana Yantra on fire source | After *Swanga Sheeta* | Separating of 2 pots | Sublimed mercury globules in upper pot

Remaining parts in lower pot

Mercury globules with soot

Collected mercury by filtering of soot through cloth

Obtained *Hingulottha Parada*

3) *Gandhaka Shodhana:*

Milk, ghee, *Ashodhita Gandhaka*

Melting of *Gandhaka* with *Ghrita*

Pouring of molten *Gandhaka & Ghrita* to milk

Swedana of *Gandhaka* in milk (after 7th *Dhalana*)

Gandhaka for drying

4) Preparation of *Dwigunakhya Rasa:*

Adding of *Shodhita Gandhaka*

Doing *Mardana* for *Kajjali* preparation

Kajjali after *Siddhi Lakshana*

Melting of *Kajjali* in *Ghritalipta Darvi*

Pouring of melted *Kajjali* on cooled surface

Adding of *Haritaki Choorna* to melted *Kajjali*

After 3hrs. of *Mardana*

Final product of *Dwigunakhya Rasa*

5) Preparation of *Triguna Rasa:*

CONCLUSION

Dwigunakhya Rasa and Triguna Rasa are the unique herbo-mineral formulation and from the pharmaceutical study, preparation of *Triguna Rasa* was felt easier compared to preparation of *Dwigunakhya Rasa*. *Triguna Rasa* might be safer to consume compared to *Dwigunakhya Rasa.* Because, *Rasashastra* mentions *Sagandha* preparations of mercury is safer than *Nirganda* mercuric formulations. For confirming the above statement, further researches are needed in future.

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REFERENCE

1. Angadi Ravindra, A Text book of Rasashastra (Iatro-chemistry and Ayurvedic Pharmaceutics), Varanasi, Chaukhambha Surbharati Prakashan, 2018; 2: 11.

2. Sri Gopal Krishna Bhatt, Rasendra Sara Samgraha, Parimita Bhodhini Commentary and appendix, Dr. Parimi Suresh and Dr. Vinaya Kumari Dhannapunneni, Varanasi, Chaukhambha Sanskrit Sansthan, first edition, 2007; 2: 1-3, 600-601.
3. K.V Krishna Vaidyan and S. Gopala Pillai, Sahasrayoga, Sujanapriya commentary, Vidyarambham publication, Gutika yoga prakaranam, 2015; 33: 134.
4. Sadananda Sharmana, Rasatarangini, Kashinada Shastrina, Moteelal Banarasi Das publication, 2004; 5(9): 16, 202.
5. Sadananda Sharmana, Rasatarangini, Kashinada Shastrina, Moteelal Banarasi Das publication, 2004; 2(3): 31 - 16.
6. Acharya Vagbhata, Rasaratnasamucchaya, Siddhiprada Hindi commentary, Siddhi Nandhan Mishra, Varanasi, Chaukhambha Orientalia, 2011; 3: 20 - 64.