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A Pharmaceutical Study on *Panchanan Rasa*

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ABSTRACT

Rasa Shastra is a specialized branch of Indian system of traditional medicine which mainly deals with the use of metals, minerals and herbs along-with the application of varied principles of Alchemy. *Panchanan Rasa* a chief reference from *Rasa Ratna Sammurchya 14/09* was taken for *Hridya Roga*. It is a herbo-mineral preparation made finally with the use *Kharal Yantra* so called *Kharaliye Rasayan*, & is given after proper *Mardan* only in powder form with vehicle indicated for administering it. In recent scenario *Hridya Roga* is becoming a major concern disease every 1 in 10 person is suffering from sudden/chronic heart/artery disease with varied etiology & also patients are not able to afford such costly intervention to manage it, so effort is made to do pre-clinical study on the formulation & get some data to go for further clinical study in future.

Key words: *Rasa Shastra, Panchanan Rasa, Kharaliye, Hridya Roga, Alchemy*

INTRODUCTION

Rasa Shastra & Bhaishajya Kalpana branch of *Ayurveda*, a broad science of medicine, emphasizes following standard pharmaceutical procedures when developing medicines. Most of the basic principles of are like *Shodhana, Jarana, Marana*, and *Bhavana* etc. are an integral part of drug development. They help improve the properties of the medicine & make the medicine more suitable, attractive & palatable. This pharmaceutical science has the following characteristics, namely immediate effectiveness, small

doses & wide therapeutic applicability, regardless of constitutional differences.

An attempt was made to establish pharmaceutical procedure for preparation of the research formulation i.e., *Panchanan Rasa*. In this section all the processes adopted for the preparation of *Panchanan Rasa* with explicit detail of procurement of raw material quantity, duration, materials & methods along with timely observed and recorded values are presented.

Need of study

Herbal medicines are indicated in *Hridya Roga*, but the work on *Rasa Aushadhi* has not been so far much explored, *Panchanan Rasa* has been mentioned in *Rasa Ratna Samu-Chya* for the treatment of *Hridya Roga*, as per our knowledge is concerned there has been no pharmaceutical and analytical study on *Panchanan Rasa*, so there is need for establishing its pharmaceutical and analytical process, so this study has been taken.

REVIEW OF LITERATURE

It is one of the potent herbo-mineral drugs and the detailed description of ingredients, usage, properties,

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method of preparation, and therapeutic effect of *Panchanan Rasa* is mentioned in *Rasa Ratna Samuchchya, Hridya Roga Chikitsa* chapter 14/09.^[1]

AIM AND OBJECTIVES

To conduct pharmaceutical study to assess the formulation development procedure of formulation.

MATERIALS AND METHODS

Materials^[1]

1. *Parad* (Mercury [Hg])
2. *Gandhak* (Sulphur [S])
3. *Amla* (*Phyllanthus emblica*)
4. *Draksha* (*Vitis Vinifera*)
5. *Yashtimadhu* (*Glycyrrhiza glabra*)
6. *Khajur* (*Phoenix dactylifera*),

Were obtained from the *Rasa Shashtra Pharmacy of Pt. Khushilal Sharma Govt. Ayurveda Institute Bhopal MP* & was purified as per the classical methods.

Methods: Pharmaceutical study

Associated drugs and their procurement:

- *Godugdha* (Cow's milk): Amul Dairy, Bhopal
- *Goghrita* (Cow's ghee): Amul Dairy, Bhopal
- *Quick Lime*: Local Market, Bhopal
- *Garlic* (*Allium Sativum*): Local Market, Bhopal
- *Saindhava* (Pink Salt): Pharmacy of *Rasashastra evam Bhaisajya Kalpana, Bhopal*
- Water (RO Water): Pt. Khushilal Sharma Govt Ayurveda College, Bhopal

Following are subdivided into such headings:

- Processing of Raw Materials
- *Parada Shodhana*
- *Gandhaka Shodhana*
- Preparation of *Kajjali*
- Preparation of *Kwath*^[5] for *Bhavana*
 - *Kwath* of *Amalaki*, 1 times *Bhavana*

- *Kwath* of *Yashtimadhu*, 1 times *Bhavana*
- *Kwath* of *Draksha*, 1 times *Bhavana*
- *Kwath* of *Khajura*, 1 times *Bhavana*

- Preparation of *Panchanan Rasa*

Table 1.1: Showing ingredients of *Panchanan Rasa*

SN	Ingredients	English Name	Quantity
1.	<i>Shuddha Parada</i>	Mercury	100gm
2.	<i>Shuddha Gandhaka</i>	Sulphur	100gm
3.	<i>Khajura</i>	<i>Phoenix dactylifera</i>	50ml
4.	<i>Amla</i>	<i>Phyllanthus emblica</i>	50ml
5.	<i>Yashtimadhu</i>	<i>Glycyrrhiza glabra</i>	50ml
6.	<i>Draksha</i>	<i>Vitis vinifera</i>	50ml

Parada Shodhana

Reference: *Rasa Tarangini*^[2]

Principle: *Mardana & Prakshalana*

Samanya Shodhana of *Parada* was carried out in two phases:

- By *Shudha Churna* (*Quick Lime*)
- By *Rasona & Saindhava Lavana*

Parada Shodhana by Sudha Churna

Table 1.2: Showing ingredient & quantity

Starting	Materials	Quantity	Completion
30/10/2022	<i>Ashodhita Parada</i>	500 gm.	12/11/2022
	<i>Shudha Churna</i>	500 gm.	

Equipment: *Khalva Yantra*, Cotton Cloth, Mask, Gloves, Spatula Tray, Plastic Vessel, Hot Water.

Methods

- *Ashodhita Parada* (500gm.) & *Shudha Churna* (500gm.) was taken in a mortar & was triturated for 47 hours with the help of pestle.

- *Shodhita Parada* was collected from *Shudha Churna* by *Vastragalana*.
- Remaining *Shodhita Parada* was obtained by *Urdhapatana* method.
- The quantity of *Shodhita Parada* obtained was 474.15 gm.

Parada Shodhana by Rasona Kalka and Saindhav Lavana

Table 1.3: Showing ingredients & quantity

Date of starting	Ingredients	Quantity	Completion
12/11/2022	<i>Parada</i> (obtained from <i>Shudha Churna</i>)	474.15gm.	19/11/2022
	<i>Rasona</i> (peeled garlic)	474.15gm.	
	<i>Saindhava Lavana</i> (Pink salt)	237.07gm.	

Equipment: *Khalwa Yantra*, Cotton Cloth, Mask, Gloves, Spatula Tray, Plastic vessel, Hot water.

Procedure

- *Shudha Shodhita Parada* (450gm.) and *Rasona Kalka* (474.15gm.) were added in the mortar and half the quantity of *Saindhava Lavana* (237.07gm.) was added and is triturated for 30hrs.
- *Prakshalana* of garlic paste was done with lukewarm water for 3 times.
- Every time, the supernatant water was collected & dried to obtain the *Parada*.
- The remaining garlic paste was dried in sunlight & *Parada* was obtained by scrapping.
- *Urdhapatana* process was also performed to obtain the remaining *Parada* from the *Rasona Kalka*.

Gandhaka Shodhana^[3]

Reference: *Rasa Tarangini*

Principle: *Dhalana*

Equipment's: Stainless Steel Vessels, Gas Stove, Spatula, Cotton Cloth, Infrared Thermometer.

Date of starting: 14/12/2022

Date of completion: 28/12/2022

Ingredients

Table 3.10: Showing list of ingredients for *Gandhaka Sodhana*

<i>Dravya</i> taken	1 st <i>Dhalana</i>	2 nd <i>Dhalana</i>	3 rd <i>Dhalana</i>	Final result
<i>Asuddha Gandhaka</i>	500gm.	457gm.	429gm.	414gm.
<i>Goghrita</i>	500gm.	500gm.	500gm.	
<i>Godugdha</i>	1000ml	1000ml	1000ml	

Procedure

- 500gm. *Ashodhita Gandhaka* was crushed in *Khalva Yantra* to obtain fine powder.
- 500gm. of *Goghrita* was heated & melted in a vessel.
- Then powdered *Gandhaka* was added in *Goghrita* & stirred continuously till it got completely melted.
- 1000ml *Godugdha* was taken in another steel vessel & a cotton cloth was tied over it.
- Then molten mixture of *Gandhaka* & *Goghrita* was poured in to the vessel containing *Godugdha* through the cloth to filter the impurities.
- After self-cooling a solid mass with some granular part of *Gandhaka* was taken out from the vessel & thoroughly washed with hot water to remove the *Snehansha*.
- Same procedure was repeated 3 times as per the reference, to obtain *Shuddha Gandhaka*.

Preparation of *Kajjali*

Reference: *Rasa Ratna Samucchya*

Principle: *Mardana*

Equipment's: *Khalva Yantra* (Mortar and Pestle), Spoon, Plate.

Ingredients:**Table 3.13: Showing ingredients & quantity for Kajjali Preparation**

Date of starting	Ingredient	Quantity	Completion
29/12/2022	Shuddha Parada	380gm.	04/01/2023
	Shuddha Gandhaka	380gm.	

Procedure

- 380gm. of *Shodhita Parada* & 380gm. of *Shodhita Gandhaka* were taken in the *Khalva Yantra* & triturated for 37 hours.
- Trituration was continued until the *Kajjali* became black color, lusterless, *Varitara* & fulfil all criteria of *Kajjali* as mentioned in AFI.

Preparation of Kwath^[5]: *Yashtimadhu, Amla, Khajura, Draksha*

Name of procedure: Preparation of *Kwath*

Reference: Sh.Sa.Ma.Kh.9

Date of inception: 31/01/2023

Date of Completion: 04/02/2023

Principle: *Kwathan* (Boiling)

Equipment's: Iron Vessel, Spatula, Gas Stove, Cloth, Measuring Jar, Infrared Thermometer

Material:

Kwath Dravya - 40gm.

Portable water - 640ml

Methods:

- 40gm. of *Yavakuta Kwath Dravya* was kept in vessel.
- 640ml drinking water (16 times of drug) was taken in vessel & kept overnight.
- Next day to prepare *Kwath* a vessel kept on mild heat without covering its mouth.

- Boiling was continued and reduced the quantity up to 1/4th of initial.
- The mixture was then filtered through double folded cotton cloth and kept in a vessel.
- Further this *Kwatha* was used for *Bhavana* in the formulation.

Preparation: *Panchanan Rasa*

Name of procedure: Preparation of *Rasa* with *Bhavana, Mardana*

Reference: R.R.S. 14/21

Date of inception: 01/02/2023

Date of Completion: 05/02/2023

Principle: *Mardana & Bhavana*

Equipment's: Mortar And Pestle, Stainless Steel Plate, Dryer, Spatula

Material: *Kajjali, Yashtimadhu Kwatha, Amla Kwatha, Khajura Kwatha, Draksha Kwatha*

Methods

Pre-procedure: Main ingredients were taken in *Kharal* i.e.,

- Kajjali* - 200gm
- Yashtimadhu Kwatha* - 50ml
- Amlaki Kwatha* - 50ml
- Khajura Kwatha* - 50ml
- Draksha Kwatha* - 50ml

Main-procedure

Panchanan Rasa was prepared in mortar & pestle by the *Mardana* procedure, taking *Samguna Kajjali* was prepared by taking *Shuddha Parada & Shuddha Gandhaka*. Once *Kajjali* was prepared, the mixture was subjected to each *Bhavana* of *Yashtimadhu Kwatha, Amlaki Kwatha, Khajura Kwatha, Draksha Kwatha*. Each *Bhavana* took one day to complete the procedure. Triturate the whole mixture to form paste & then mixture was dried in shade to get powder.

Observation

Table 2.1: showing observation of Parada Shodhana by Shudha Churna

Time of Trituration	Observations
3 Hours	<i>Parada</i> started disintegrating into medium sized globules. On resuming maximum amount of <i>Parada</i> reappeared at the base of the <i>Khalvayantra</i> .
6 Hours	Mixture of <i>Shudha</i> & <i>Parada</i> turned into light gray color, <i>Parada</i> seen at the base of <i>Khalvayantra</i> .
9 Hours	<i>Parada</i> disintegrated in small globules of and light gray color of <i>Shudha Churna</i> was seen.
12 Hours	Mixture became heavy and grey in color.
18 Hours	Very small droplets of <i>Parada</i> were visible on minute observation of the mixture.
21 Hours	<i>Parada droplets</i> were completely mixed. Dark gray color of mixture was seen.
35 Hours	Dark gray color of mixture was seen
47 Hours	<i>Mardana</i> process completed.

Table 2.2: Showing observation of Parada Shodhana by Rasona & Saindhava Lavana.

Triturating Time	Observed changes during Parada Shodhana
1 Hour	Mixture of <i>Rasona</i> and <i>Saindhava</i> was formed but <i>Parada</i> was clearly visible.
3 Hours	<i>Parada</i> started to disintegrate & mix with the garlic paste forming small globules.
6 Hours	Garlic paste changes to light greyish color
9 Hours	Color of paste was dark grey & few small particles of <i>Parada</i> was visible.
18 Hours	Dark grey color of mixture was seen.
25 Hours	<i>Parada</i> was homogenously mixed in the mixture & no <i>Parada</i> droplets were visible.

28 Hours	<i>Parada</i> was homogenously mixed in the mixture but <i>Mardana</i> was continued, color of garlic paste turned to blackish gray.
30 Hours	<i>Mardana</i> process completed.

Table 2.3: Showing Organoleptic characters of Parada after Shodhana

Parameter	Characteristics
Color	Shiny white
Appearance	Bright and shinny
Consistency	Liquid
Odor	Not specific

Table 2.4: Showing observation during Gandhaka Shodhana

Parameter	Before Shodhana	On heating	After Shodhana
Color	Bright yellow	Reddish brown	Dark yellow
State	Crystalline solid	Liquid	Granular
Touch	<i>Khara</i>		<i>Snigdha, Mridu</i>
Taste	Bitter		Tasteless
Odor	Pungent		<i>Goghrita</i>

Table 2.5: Showing the observation during the Mardana process of Kajjali

Time of Trituration (Hours)	Observation
0	<i>Parada + Gandhaka</i>
3	Minute <i>Parada</i> particle was seen in <i>Gandhaka</i>
6	<i>Parada</i> was completely mixed with <i>Gandhaka</i> , but shine of <i>Parada</i> could be seen

9	Mixture became greenish black.
12	Mixture became dark grey in color. Shine of <i>Parada</i> was seen.
15	Soft texture of mixture with shiny particles.
20	<i>Mardana</i> was continued to attain complete <i>Lakshana</i> of <i>Kajjali</i> .
24	Attained <i>Rekhaipoorna</i> & <i>Slakshnatwa</i> . Dark black color was seen.
34	<i>Nischandratwa</i> was observed.
37	Showed completion of <i>Kajjali Lakshana</i>

Table 2.6: Showing Organoleptic examination of *Kajjali*

Parameter	Characteristics
Color	Black
Form	Fine powder
Taste	Tasteless
Odor	Mild Pungent
Touch	Soft and Smooth
Appearance	<i>Anjana Sadrasha</i>

Observation

- *Kwatha* attained brown color.
- *Kwatha* became soft because of soaking in water whole night.
- To prepare *Kwatha* the temperature was to be maintained is 80-85°C.
- The whole procedure was completed in 1hr.

Table 2.7: Showing *Bhavana* for *Panchanan Rasa*

<i>Bhavana</i> no.	<i>Bhavana Dravya</i>	<i>Bhavana Dravya</i> Quantity	Time taken for <i>Bhavana</i>
1 st	<i>Yashtimadhu Kwatha</i>	50ml	1 hr.
2 nd	<i>Amla Kwatha</i>	50ml	1 hr.

3 rd	<i>Khajura Kwatha</i>	50ml	1 hr.
4 th	<i>Draksha Kwatha</i>	50ml	1 hr.
Total = 04		200ml	4 hours

Results

Table 3.1: Showing result of *Parada Shodhana* by *Shudha Churna*

Parameter	Weight
Initial wt.	500gm.
Wt. Obtained by <i>Vastraganan</i> and <i>Urdhapatana</i>	474.15gm.
Total wt. Obtained	474.15gm.
Loss of wt.	25.85gm.
Loss of wt. %	5.17%

Table 3.2: Showing result of *Parada Shodhana* by *Rasona* and *Saindhava Lavana*.

Parameter	Weight
Initial wt.	474.15gm.
Wt. obtained by <i>Prakshalana</i> , <i>Scrapping</i> & <i>Urdhvapatana</i>	445.23gm.
Loss of wt.	23.32gm.
Loss of wt. %	4.92%

Table no. 3.3 - Showing loss during Purification of *Parada*.

Parameter	Weight
% Loss in 1 st <i>Shodhana</i>	5.17%
% Loss in 2 nd <i>Shodhana</i>	4.92%
Total Loss of wt. %	10.09%

Total no. of days taken	21 days
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Table 3.4: Showing result during Gandhaka Shodhana.

Parameter	Weight
Ashodhita Gandhaka	500gm.
Shuddha Gandhaka	414gm.
Total loss of wt.	86gm.
Total loss of wt. %	17.2 %
Total no. of days	15

Table 3.5: Showing result during Kajjali preparation.

Parameter	Weight
Time duration	37 hours
Final weight of prepared Kajjali	742gm.
Loss of weight	18gm.
Loss of Wt. %	2.36 %
Total days taken	7 days

Table 3.6: Results of Kwatha preparation

Date	Bhavana	Bhavana Dravya	Amount	Water	Kwatha	Time	Completed
01/02/2023	1 st	Yashtimadhu	40gm	640 ml	80ml	1hr	02/02/2023
02/02/2023	2 nd	Amla	40gm	640 ml	80ml	1hr	03/02/2023
03/02/2023	3 rd	Khajura	40gm	640 ml	80ml	1hr	04/02/2023
04/02/2023	4 th	Draksha	40gm	640 ml	80ml	1hr	05/02/2023

Table 3.7: Showing the result of Panchanan Rasa

SN	Parameter	Quantity
1.	Wt. of Kajjali	200 gm.

2.	Wt. of all herbal drug	160gm
3.	Vol. of Yashtimadhu Kwatha	50ml
4.	Vol. of Amla Kwatha	50ml
5.	Vol. of Khajura Kwatha	50ml
6.	Vol. of Draksha Kwatha	50ml
7.	Final prepared weight of Panchanan Rasa	220gm
8.	Wt. gain	20gm
9.	Wt. gain %	10%

DISCUSSION

Mercury (*Parada*) is a vital component in many *Rasa Shastra* formulations. The proper handling, purification, and incorporation of mercury into these medicines require a deep understanding of its properties & reactions. The validity & credibility of *Rasa Shastra* as a branch of Ayurveda depend on successfully mastering the practical aspects of preparation. This highlights the importance of tradition, expertise & adherence to established methods in this field.

So here we discuss about the pharmaceutical study of drug in stepwise procedure -

- *Sodhana of Parada*
- *Sodhana of Gandhaka*
- Preparation of *Kajjali*
- Preparation of *Panchanan Rasa*

Shodhana of Parada

Purification of mercury is a vital process to be carried out, before using it in any of *Rasayoga* (Herbo-mineral preparation) for internal administration. As Quick lime, Garlic, & *Saindhava Lavana* are easily available for normal purification of *Parada* as indicated in the text, to make *Parada* fit for consumption & devoid of any impurities. The total quantity of *Parada* was taken 500gm & obtained was 474.15gm & the loss observed was 25.85gm. Again 474.15gm of *Parada* was

trituration with 474.15gm of *Nistush Rasana* and 237.07gm of *Saindhava Lavana*. The loss that was observed was due to spitting of material in *Khalvya Yantra*, during washing of *Parada (Prakshalan)* i.e., loss due to *Jala Gati*. The heat produced due to continuous friction of mortar & pestle along with the uniform rising of temperature would seize the impurities into the quick lime, *Rasana & Saindhava Lavana*. The obtained *Parada* was bright, clear & shiny white like mirror after *Samanya Shodhana* as it has undergone purification procedures the impurities got dissolved or absorbed in the quick lime with trituration (47hours). With garlic paste & *Saindhava Lavana* the trituration was done for 30hours making it bright in colour. *Parada* trituration with *Sudha Churna, Rasana Kalka & Saindhava Lavana* are viable methods. Garlic's sulphur compounds are thought to have chelating properties, which means they can help bind to heavy metals like mercury & facilitate their removal from the body. This chelation process is considered beneficial in reducing the toxic effects of heavy metal poisoning.

The use of garlic in the purification of mercury is an intriguing concept. Traditional purification processes aim to remove impurities & make the mercury safer for medicinal use. Garlic's chelating properties could potentially aid in this purification process. Once purified, the mercury can be used in various pharmaceutical procedures and as an ingredient in formulations within *Ayurveda* and other traditional medicine systems. These formulations are believed to have therapeutic benefits for various health conditions.

It's important to note that while garlic may aid in the purification of mercury, the properties of the resulting purified mercury could differ from its original form. As you mentioned, it's possible that the purified mercury, known as *Sodhit Parada* may have altered solubility characteristics in the gastrointestinal tract due to interactions with digestive enzymes, changes in pH, & complexation with other biomolecules. This could affect its bioavailability & therapeutic effects.

Sodhana of Gandhaka

After the completion of the *Gandhaka Sodhana* process (the purification of Sulphur), it is observed that

some loss occurs. This loss could be attributed to the filtration of molten Sulphur, as well as the removal of various impurities, including fat-soluble and water-soluble substances, and physical impurities.

Powdering Sulphur is mentioned as a step in the purification process. This is done to increase the surface area, which facilitates quicker melting of Sulphur. After purification, the Sulphur changes from a crystalline to an amorphous nature. This transformation is attributed to the repeated heating, melting, and sudden cooling process. It's suggested that this amorphous state may be helpful in dissolving impurities present in Sulphur. The color of Sulphur changes from dark yellow to bright yellow with each repetition of the purification process, indicating the removal of impurities. Heating before melting is mentioned as a step that aids in the removal of some impurities through the oxidation process. Sulphur is purified with *Ghrita* (clarified butter) and milk, both of which have *Madhura Rasa* (sweet taste) and are considered *Jeevaniya Dravya* (rejuvenating substances). This purification process is believed to remove *Visha Dosha* (toxicity) from Sulphur and incorporate unctuous (unctuous or oily) properties into it, potentially helping to dissolve fat-soluble impurities.

Sulphur is a constituent of proteins, including amino acids like Cysteine, & Methionine. It's involved in the formation of bile acids for fat digestion and absorption, cellular oxygen utilization, and detoxification mechanisms in the body.

Preparation of Kajjali

Kajjali is prepared by using 380 grams of *Shuddha Parada* and 380 grams of *Shuddha Gandhaka*. The two ingredients are triturated (ground or rubbed together) for 37 hours to achieve specific characteristics known as "*Siddhi Lakshanas*," which may include attributes like *Nischandra* (shiny) and *Varitara* (soft). It's noted that the trituration process may require slow and firm grinding to attain these desired characteristics. Some loss may occur during the trituration process, which could be due to dusting of *Kajjali*. This suggests that a careful & controlled process is necessary to minimize loss. Through the trituration process, *Parada*,

Gandhaka, and other metals & minerals present in the ingredients are converted into a very fine, soft powder, similar to *Anjana* (Collyrium). *Kajjali* is believed to have the potential to cure various diseases when used properly in combination with other metals or herbs. It's considered the first *Murchana* (grinding or trituration) of *Parada* and involves a specific *Bandha* or bonding process. *Kajjali* therapeutic impact is suggested to be multidimensional & could involve various mechanisms, including scavenging of free radicals (antioxidant activity), antimicrobial properties, reactivity with other substances, pro-enzymatic effects, or modulation of the immune system.

Preparation of Panchanan Rasa

Kajjali was prepared using equal proportion of *Shuddha Parada* and *Shuddha Gandhaka* according to the reference of *Rasa Tarangini*. The formed *Kajjali* 200gm was then triturated with decoction of *Amlaki*, *Yashthimadhu*, *Draksha*, and *Kharjura* 50ml each was given per day respectively, *Mardana* was continued till the formulation got dried up then it was dried in shade completely and kept in air tight glass bottle.

CONCLUSION

Panchanan Rasa is a *Kharaliya Rasayan* drug indicated for *Hridya Roga*, to be taken with *Amla Churna*, *Sarkara Churna*, and water. Based on the study and the data related to time, observations, and results, we can understand the significant effort and time required to formulate a quality Ayurveda herbo-mineral product in *Rasa Shastra* and to develop the corresponding pharmaceutical procedures. The data from this study

can be used to establish a standard operating procedure for the development of *Panchanan Rasa* in the future, as well as to initiate clinical trials.

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