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PHARMACEUTICO-ANALYTICAL STUDY OF *SAMANYA* AND *VISHESHSHODHANA* OF *PARADA*

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ABSTRACT

Background: Rasashastra is a branch of Ayurveda, related with the formulations involving drugs of metal/mineral origin. The different perspectives secured under this department are their origin, varieties, physical and chemical characteristics, therapeutic properties and their uses. Parada has the capability of consuming all the metals and minerals by which it attains high therapeutic value over other medicines. Shodhana is the process, which not only removes the Doshas but also increases strength and potency of the drug. Depending upon the nature of the metal and the disease for which they are meant to be used, the specific process for purification vary from one metal to the another and the process is repeated for several times. **Aims and Objective:** Purification of Parada (mercury) was carried out classically as per the Rasa Tarangini reference and its organoleptic characters were observed. **Materials and Methods:** In Rasashastra different references by different authors are available for Shodhana of Parada. For the present study Parada was done as mentioned in classical book (Rasa Tarangini). Detailed observations and organoleptic characters were noted during the procedure. **Results and Conclusion:** This Classical pharmaceutical procedure was chosen; as the ingredients were easily available. Total quantity of Parada taken was 100g and obtained quantity of Parada from Sudha (Lime) Churna was 74g, from Lashuna and Saindhava Kalka obtained quantity of Parada was 65g, further Parada remained after Naga Dosha Nivarana was 61g and after Vanga Dosha Nivarana was 56.93g. Following this method of Shodhana (purification) Parada can be purified and used for various pharmaceutical procedures also as

an ingredient in various formulations making it potent therapeutically.

KEYWORDS: *Parada, Shodhana, Rasa Tarangini, Sudha Churna, Lashuna* and *Saindhava Kalka, Naga Dosha Nivarana, Vanga Dosha Nivarana*.

INTRODUCTION

Rasashastra, Rasa or *Parada* has been referred to as having divine origins and being associated to Lord "*Shiva* or *Hara*" in ancient literature. The significance of *Parada* in *Rasa* literature as *Rasa Chikitsa* is stated in several instances. Due to the significance of the *Shodhana* process in *Rasashastra*, a variety of purifying techniques are outlined for each metal and mineral as well as for *Visha* and *Upavisha* (toxic substances). Even though the word *"Shodhana"* has a purification related literary meaning, in *Rasashastra* it refers to a *Sanskara* (process or procedure) that essentially causes changes or alterations in properties in addition to purification. Using prescription medications and recommended techniques, such as trituration. It lessens damaging effects and gets rid of chemical and physical impurities. By preparing the raw material for further processing, like *Marana*, it increases the drug's medicinal value (incineration). *Parada* is regarded as a heavy metal that contains a variety of impurities and has poisonous and harmful effects on the body, thus its purification is necessary.[1]

Most of the raw materials (metal and minerals) are extracted from earth. So there is every chance of mixing of impurities, toxicity, heterogeneous and unwanted substances to a large extent. *Shodhana* is indicated to induce certain qualities, which are essential for the safe and easy assimilation of the material in the living body.

Dosha (impurities) of *Parada* are classified as follows.

1. *Naisargika Doshas* (natural impurities),
2. *Yougika Doshas* (physical impurities),
3. *Aoupadika Doshas* (chemical impurities in the form of coating).

1. *Naisargika Dosha* (Natural impurities)[2]

Naisargika Dosha are the *Dosha* which are mixed or found in mercury from the nature or natural sources. These are 3 in number:

(a) Visha Dosha

(b) Vahni Dosha

(c) Mala Dosha, these three *Dosha* causes *Mrityu, Santapa, Murcha*.

2. *Yaugika Dosha*[3]

Yaugika Dosha are the *Dosha* which are mixed from outside as adulterants in *Parada* by the sellers for commercial benefits. All the *Rasa* texts have mentioned two types of *Yaugika Dosha* except "*Rasendra Mangalam*", where these are included in *Aupadhika Doshas*. These 2 two *dosha* are.

(a) Nagaja.

(b) Vangaja, these *dosha* causes *Jadta, Adhymana, Kushtha.*

3. *Aupadhika/ Kanchuka Dosha*[4]

Table 1: 5 types of *Aupadhika Dosha* of *Parada*.

Aupadhika Dosha	Number	Effects
Bhumija	1	*Kushtha*
Girija	1	*Jadyta*
Varija	1	*Vataja Vikara*
Nagaja	2	*Tridosha Prakopa*
Vangaja	2	*Tridosha Prakopa*

Table 2: *Saptakanchuka Dosha* of *Parada*.[5]

Doshas	Source	Effects
Parpati	*Mrinmaya* (from *Prithvi*)	*Kushtha*
Patani	*Pasanaja* (from *Giri*)	*Jadya*
Bhedi	*Jalaja* (from *Vari*)	*Mala Bhedakaraka*
Dravi	*Nagaja* (*Kapalika*)	*Dhatudravitakara*
Malakari	*Nagaja* (*Shyama*)	*Malakaraka*
Dhwanksi	*Vangaja* (*Kalika*)	*Karkasha Swara*
Andhakari	*Vangaja* (*Kapali*)	*Andhakaraka*

Shodhana of *Parada*

Generally two types of *Shodhana* procedures are mentioned in texts viz.

1. *Samanya Shodhana*
2. *Vishesha Shodhana*

1. *Samanya Shodhana* of *Parada*

a. *Ashudha Parada* is triturated with equal amount of *Sudha* (lime powder) and triturated for 3 days then filtered through the cloth. Then further triturated with equal amount of *Nistusha Lashuna* (peeled garlic) and half part of *Saindhava Lavana* (Rock salt) in *Khalvayantra* till *Parada* gets divided into smaller particles and gets mixed with the paste

properly and is converted into blackish in colour. Finally it is washed with Luke warm water and filtered through double folded cloth.[6]

b. *Ashudha Parada* is triturated with *Paana Swarasa, Ardraka Swarasa, Yavakshara, Sarjikshara, Shuddha Tankana* for 3 days.After that wash it with *Kanji*. *Shodhita Parada* with this process shine like a pearl and is devoid of *Saptakanchuka Dosha*.[7]

c. *Ashudha Parada* is triturated with *Sudha* for seven days then triturated with *Graha dhoom, Haridra Choorna, Ishtika Choorna* for 3 days that wash it with *Kanji* and preserve. *Parada Shodhana* with this process is devoid of *Saptakanchuka Dosha*.[8]

d. Equal quantity of *Guda, Trikatu Choorna, Ajwain, Pancha Lavana, Chitrakamool Choorna, Triphala Choorna, Yava Kshara, Sarji Kshara, Shuddha Tankana, Dhatura beej,* Mustard seeds should be taken in an equal quantity and powdered and added 1/20th part of this powder to *Parada* and trituration is done for 7 days.[9]

e. *Ashudha Parada* is triturated with *Ghritakumari, Chitrakamoola,* Red mustard seeds, *Choti Kateri, Triphala Kashaya* for 3 days, then washed and preserved.[10]

2. *Vishesha Shodhana*[11]

In *Vishesha Shodhana* for the removal of each *Dosha*, specific drugs are used. Each *Shodhana Dravya* is taken 1/16th part of *Parada* in quantity and then *Ghritkumari Swarasa* is added and triturated for one day. Then it is washed with *Kanji*. The drugs, which are used to remove each *Dosha*, are given in tabular form.

Table 3: *Vishesha Shodhana* of *Parada.*

Naga Dosha	*Grahadhooma, Ishtika Choorna, Haridra Choorna, Dagdha Urna Choorna*
Vanga Dosha	*Indrayava, Ankola, Haridra Choorna*
Agni Dosha	*Chitraka Moola*
Mala Dosha	*Amaltasa Twak Choorna*
Chapalya Dosha	*Krishan Dhatura Beeja or Panchanga*
Visha Dosha	*Triphala Choorna*
Giri Dosha	*Trikatu Choorna*
Asahagni Dosha	*Gokshura Choorna*

Table 4: Pharmaco-therapeutic properties of *Parada*.

Rasa *- Shada Rasa*	***Guna*** *- Snigdha, Sara, Guru*
Virya *– Ushna*	***Vipaka*** *– Madhura*
Karma: *Sarvarogajita, Shodhana, Ropana, Krimighana, Yogavahi, Rasayana, Balya, Vrishya, Vajikarana, Pushtikara, Ayushakara, Dristi Bala*	***Rogaghanata:*** *Jwara, Raktapitta, Kasa, Pandu, Atisara, Pravahika, Visuchika, Ajeerana, Arsha, Hikka,Vamana, Mutrakriccha, Amajanyashula, Parinama shula, Shotha, Kamala, Vatarakta, Gridhrasi, Krimi, Kustha, Kilasa,*

Prada, Dehasiddhikara, Lauha Siddhikara, Purusharthachathustaya kara.	*Apasmara, Unmada, Prameha etc.*

MATERIALS AND METHODS

Procurement of Raw material

Raw materials such as *Ashudha Parada* were procured certified from Herbasia biotech, Amritsar.

Process

The study was conducted in the Government Ayurvedic Pharmacy, Patiala, Punjab as per the reference of *Rasa Tarangini*.[6] Type of procedure adopted was *Mardana* (trituration).

Practical No. 1 Name of the practical: *Samanya Shodhana* of *Parada*[6]Ingredients

- *Ashuddha Parada* - 100 gm
- *Sudha* (Lime powder) - 100 gm
- *Lasuna*(peeled garlic) - 74 gm
- *Saindhava Lavana* - 37 gm
- Hot water- Quantity sufficient

Equipments: *Khalva Yantra*, vessels, Spatula, Cloth, weighing machine, earthen plate, plastic bucket etc.

Procedure

- *Asuddha Parada* and *Sudha* (lime powder) in equal quantity were mixed in *Khalva Yantra* and triturated for 36 hours.
- Then the mixture was added to double layered cloth to separate *Parada* from it.
- To separate remaining *Parada* in mixture, the mixture was slowly washed with warm water till the water became colourless and only *Parada* was remained.
- *Parada* was weighed and equal quantity of *Lasuna* paste with half the quantity of *Saindhava Lavana* were added together and triturated for 36 hours till the paste of *Lasuna* turned into black colour.
- Then this paste was slowly washed with warm water till the *Shuddha Parada* was collected.
- *Shuddha Parada* was weighed and preserved for further use.
- Precautions:

- *Mardana* should be done very carefully as *Parada* may spill out of *Khalva Yantra*.
- Washing of the paste should be done slowly otherwise *Parada* will be lost in *Jalagati*.

Practical No. 2

Name of the practical: *Parada Naga Vanga Dosha Nivarana (VisheshaShodhana).*[11]

Ingredients.

- *Samanya Shodhita Parada* - 65 gm.
- *Grahadhuma* – 4 gm (1/16th part of *Parada*).
- *Ishtika churna* - 4 gm (1/16th part of *Parada*).
- *Haridra churna* - 4 gm (1/16th part of *Parada*).
- Fine cut wool - 4 gm (1/16th part of *Parada*).
- *Indrayana* - 3.8 gm (1/16th part of *Parada*).
- *Ankola* - 3.8 gm (1/16th part of *Parada*).
- *Haridra churna* - 3.8 gm (1/16th part of *Parada*).
- *Ghritakumari Swarasa* - q.s.
- *Kanji* - q.s.

Equipments: *Khalva Yantra*, vessels, Spatula, Cloth, knife, weighing machine etc.

Procedure

- For *Naga Dosha Nivarana* of *Parada, Samanya Shodhita Parada* and *Grahadhuma, Ishtika Churna, Haridra Churna*, fine cut wool, *Ghritakumari Swarasa* in mentionedquantity were mixed in *Khalva Yantra* and triturated for 12 hours.
- Then the *Parada* was separated from the mixture and washed it with *kanji* and weighed it.
- For *Vanga Dosha Nivarana* of *Shuddha Parada, Parada and Indrayana, Ankola, Haridra churna, Ghritakumari Swarasa* in mentioned quantity were mixed in *Khalva Yantra* and triturated for 12 hours.
- After that *Parada* was separated from the mixture and washed it with *kanji*, weighed it and preserved for further use.

Precautions

- *Mardana* should be done very carefully as *Parada* may spill out of *KhalvaYantra*.
- Separation from mixture should be done carefully to avoid the loss.

Analytical Analysis[12]

Analytical Analysis of *Shodhit Parada* was done at Govt. Drug Testing Lab,Patiala and Govt. approved D N Lab, Panchkula.

RESULTS AND OBSERVATIONS

Observations of *Parada Shodhana*

- After triturating for 36 hours the mixture of *Sudha* turned into dark grey colour and no free
- *Parada* globules were seen in the mixture.
- When the trituration was over, mixture of *Parada* and *Sudha* was washed with warm water, it became light grey in colour but on repeated washing it gradually become colourless and *Parada* settled at the bottom of water.
- When *Parada* was triturated along with after 30 minute the *Parada* started disintegrating into small globules and paste turned to light black colour.
- After 36 hours of trituration, the *Lasuna* and *Saindhava Lavana* paste turned totally into black colour and *Parada* in small globules form completely mixed with the paste.
- On washing the paste with warm water, *Parada* globules started mixing with each other and regained its original state in liquid form.

Table 5: The results of *Parada Samanaya Shodhana* and *Vishesha Shodhana.*

Parada	**Quantity**	**Weight Loss**	**%weight Loss**
Ashodhit Parada taken	100g		
Parada obtained after levigation with *sudha(*lime)	74g	26g	26%
Parada obtained after levigation with *Lasuna* and *Saindhava Lavana* paste	65g	9g	13.8%
Parada remained after *Naga Dosha Nivarana*	61g	04g	6.5%
Parada remained after *Vanga Dosha Nivarana*	56.93g	4.07g	7.1%
Net *Shodhit Parada* obtained and total weight loss	56.93g	43.07g	43.07%

Table 6: The results of Analytical Analysis of *Shodhit Parada.*

Analytical Tests	**Results of *Shodhit Parada***
Description	Silver white heavy liquid metal
% Hg	99.21%

Figure 1. *Ashudha Parada* 2. Trituration with *Chunna* 3. *Chunna* colour changed to dark grey 4. Filteration of *Parada* through cloth 5. *Chunna* dipped in water to obtain rest of Mercury 6. Equal quantity *Lasun* and Half quantity *Saindhav Lavana* 7. *Lasun* paste, *Saindhav Lavana*, Mercury trituration 8. Mixture of *Lasun* paste, *Saindhav Lavana*, Mercury 9.Mixture colour changed

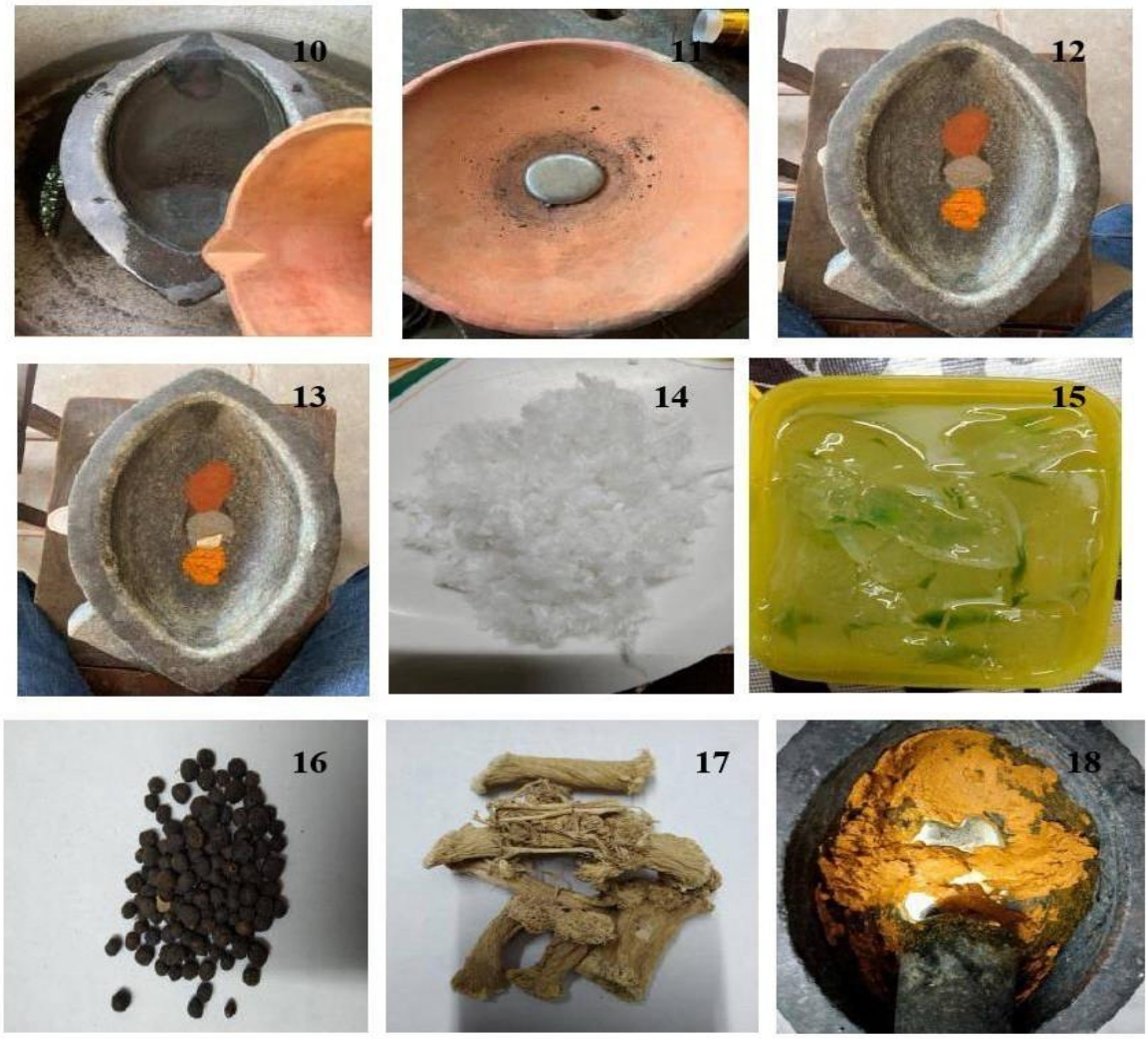

Figure 10.Washing of mixture to obtain Mercury 11.*Shodhit Parada* 12.*Haridra Churna, Grahadhum, Ishtika Churna* 13. *Haridra Churna, Grahadhum, Ishtika Churna, Shodhit Parada* 14.Fine cut Wool 15.*Ghritkumari* 16.*Indrayan* 17.*Ankol* 18.*Parada, Haridra Churna, Indrayan Churna, Ankol Churna, Ghritkumari Swarasa* mixture

DISCUSSION

In order to get rid of the *Dosha* (impurities) present in the *Parada*, various *Shodhana* procedures with various herbal ingredients have been explained in the classics. To make mercury fit for consumption and devoid of any impurities the *Shodhana* method was followed. Purification of *Parada* is a vital procedure to be carried out, before using it as an ingredient in any of the *Rasayoga* (formulations) indicated for internal administration. In the present study, *Samanaya Shodhana* of *Parada* was done by triturating it with equal quantity of lime powder for 36 hours. Again it was triturated with equal quantity of *Lasuna* paste and half quantity of *Saindhava Lavana* for 36 hours. The colour of lime powder changed to grey colour showed that the impurities from *Parada* got mixed with lime powder

by trituration. During trituration with *Lasuna* paste and *Saindhava Lavana,* the colour of mixture turned to black showed that the impurities of *Parada* got removed.

For *Naga* (lead) *Dosha Nivarana, Samanya Shodhita Parada* was triturated with *Grahadhuma, Ishtika churna, Haridra choorna,* Ignited wool (each 1/16th part of *Parada*), *Ghritakumari Swarasa* (q.s) mixture for 12 hours. For *Vanga Dosha Nivarana, Shuddha Parada was triturated with Indrayana, Ankola, Haridra choorna* (each 1/16th part of*Parada*), *Ghritakumari Swarasa* (q.s) mixture for 12 hours.

Net loss in *Samanya Shodhana* was 35% and in *Vishesha Shodhana* was 12.41% due to removal of impurities, spillage of *Parada* during trituration and loss in *Jalagati.*

Trituration with lime may help remove the alkaline soluble impurities from *Parada*. After few hours of trituration, *Parada* lost its entirety due to the compound formation with lime and converted to grey-colored powder. After trituration, it was difficult to procure the whole amount of *Parada* by *Vastra-Galana* (straining through cotton cloth) as mentioned in classics. So it was washed with hot water to obtain more amount of *Parada*. Washing requires utmost care to avoid loss of *Parada*. Hence, it could be speculated that the loss in *Parada* could be because *Parada* was entrapped in the lime due to trituration. This entrapped *Parada,* which was very minute, might be washed away and lost, during the washing process. Garlic contains approximately 33 sulfur compounds such as aliin, allicin, ajoene, allylpropyl disulfide, diallyl trisulfide, sallylcysteine, vinyldithiines, S- allylmercaptocystein, and others. Allicin is responsible for garlic's typical pungent smell. Allicin does not exist in garlic until it is crushed. Injury to the garlic bulb activates the enzyme allinase which metabolizes alliin to allicin.[13] Ajoene is the most active compound responsible for multiple bonding with *Parada*.[14] Hence in this study, media became blackish in color due to newly formed HgS compound.[15]

This loss of *Parada* could be understood by various *Gati* (mode of loss) of *Parada* described in classics. As *Parada* was triturated with lime powder, it formed very fine globules and scattered. When *Parada* was washed in water, some loss takes place as a part of *Jalagati* (loss through water). When *Parada* was triturated with lime, very fine particles of *Parada* were observed which may be scattered and lost as a part of *Hansgati* (loss due tospill out). Removal of impurities from the *Parada* imparts some amount of loss as a part of *Malagati* (loss due to removal of impurity). Heat is generated by the addition of water to lime

and also due to the fiction during the trituration process. Due to this heat, *Parada* may be lost by imperceptible evaporation, as a part of *Dhumagati* (loss due to evaporation). Vessel to vessel transfer, washing, and handling also impart subtle loss, as a part of *Jivagati* (inevitable loss). Thus, these modes of loss might be responsible for the loss in the present study.

Unprocessed *Parada* was found to have 99.8% *Parada*. After *purifying process* quantity of *Parada* was decreased to 99.21%. This may be due to this particular pre-process. Reduction in mercurial % were gradual after intermediate and final processes. This indicates that both processes have imparted chemical changes in *Parada*.

CONCLUSION

Purification is intended to get rid of impurities of Mercury. Parada is obtained with some unwanted physical & chemical impurities. So it is essential to carry out some procedures before making use of mercury. Purification of mercury is must before its usage for any purpose.

Results of the present pharmaceutical process will help future researches to reproduce the same results and could be considered as SOP. Minute decrease in mercury from 99.8% to 99.21% in the processed mercury indicate that trace elements of media are added in permissible quantity during this purifying process mentioned in *Rasatarangini*. This study also provides the information that it is not obligatory that preprocess increases the quantity of main component.

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