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Research Article

A STANDARDIZED METHOD FOR EXTRACTION OF *PARADA* (MERCURY) FROM *HINGULA* (CINNABAR) WITH THE HELP OF MODIFIED *NADA-YANTRA*

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ABSTRACT

Background: *Parada* (mercury) has both, miraculous therapeutics effects as well as mythical importance. Naturally obtained mercury contains so many impurities, so extraction of mercury from *Hingula* (cinnabar) is comparatively easy and cheaper method, also it is suitable for further preparation of formulations. In classics it is mentioned that it as beneficial as *Ashtasansakrita Parada* (mercury which has processed with eight procedures). About 18 methods found in classics to obtain mercury from *Hingula* such as *Urdhwapatana* (upward sublimation), *Adhoptana* (downward sublimation), *Tiryakapatana* (distillation). The *Urdhwapatana* method with the help of *Nada-Yantra* (pitcher instrument) is mentioned in classics but due to some lacunas mercury after dissociation get lost in form of fumes which causes less yield and researcher may have some hazardous effects because of toxicity of mercuric fumes. **Objective:** To develop a standardized method to extract *Parada* from *Hingula* through which maximum yield can be obtained and chances of harm and loss can be minimized. **Material & Method:** In this pharmaceutical research work we tried to modify classical procedure of *Hingullotha Parada* through *Nada- yantra* and evaluated its SOP. **Result:** With this modified method, mercury containing fumes get reduced and gained better yield (76.8%). **Conclusion:** *Hingullotha Parada* (collection of mercury from cinnabar) is considered as the best way to extract mercury, some small modifications in classical operating procedure can provide good yield as well as it is comparatively safer way.

INTRODUCTION

Parada or also known as *Shiva-virya*[1] (semen of lord Shiva) has so many therapeutic benefits. It is also refered as *Amruta*[2] (nectar) as it gives immortality (long and good quality of life). *Rasaeshwar Darshana* views that life is liberated from a stable body and *Parada* provides stability[3]. In *Upanishada Rasa* is termed as *Brahma* (god). All these references describe importance of *Rasa* or *Parada*. The importance of *Parada* itself signified as the whole branch is named after it. But it is naturally certain that such a precious thing cannot be obtained so easily. Seeing its importance, Indradeva asked Lord Shiva to mix some *Doshas* (impurities) in it. Now the detoxification of *Parada* becomes the great challenge.

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So, to obtain benefits of *Parada* scholars of *Rasa- Shastra* described *Parada Samanya Shodhana* (general purification), *Vishesh Shodhana* (specific purification) & various *Samskaras* (processes). All these are very tedious and costly methods so scientist choose the another method i.e. *Hingulotha Parada* (extraction of mercury from cinnabar)[4]. This method involves dissociation of *Parada* from *Hingula*. *Hingula* or HgS is red sulfide of mercury, also known as cinnabar is meant to be the best ore of mercury. *Acharya Rasavagbhatta* stated *Hingulothha Parada* is as beneficial as *Astha- Sanskarita Parada*.[5]About 18 references found in context of *Hingulothha Parada*, all the methods are nothing but the *Patana* (sublimation) method which includes *Urdhava Patana* (upward sublimation), *Adho Patana* (downward sublimation) and *Tiryaka Patana* (transverse sublimation)[6]. These different methods require different apparatus for e.g. *Damaru- Yantra* (pellet drum shape instrument), *Sthalika- Yantra*, *Nada- Yantra*, *Vidhyadhara- Yantra*. In this pharmaceutical study to obtain *Parada* from *Hingula*, *Urdhawapatana* method has opted with the

help of modified *Nada- Yantra*. Whole the study was completed in following steps-

1) Collection of raw material
2) *Hingula Shodhana* (purification of cinnabar)
3) Extraction of *Parada*
4) Collection of *Parada*

***Shodhana* (Purification):** *Shodhana* is the method of elimination of *Doshas* (unwanted or toxic substance) or in other terms, it is the method of enhancing the concentration of compound in the formulation so that yield can be increased. The *Hingula-Shodhana* can be done by two methods one is *Swedana* method (boiling method) and another is *Bhavana* method (levigation method). The boiling of *Hingula* should be done in *Dola- Yantra* using the medias like juice of *Jayanti* leaves (*Sesbania sesban*), urine, *Kanji,* lemon juice.[7] Levigation in following media like juice of *Amlavarga* (the group of sours), *Meshiksheera* (Sheep milk) and ginger juice helps to evacuate unwanted substances from *Hingula*. In this experiment *Hingula* was purified by levigation method and the lemon juice was chosen as media. Purification of *Hingula* can further divide into two parts first is *Bhavana* (trituration) and another is *Prakshalan* (hydraulic wash). *Bhavana* or levigation helps in dissociation of bond between ore and gangue followed by hydraulic washing separates them on the basis of different specific gravities.

Separation of *Parada*: To obtain *Parada*, ore should burn with cloth by making a bolus. This separation principle is known as sublimation. In this step mercury get transit into gaseous phase under higher temperature. After bond dissociation mercury get deposit onto the top of *Nada* (earthen pot), as this part of instrument contains wet cloth to provide comparatively lower temperature.

Collection of *Parada*: Most of *Parada* get accumulate in *Nada* and some amount found in the ash. One should cautiously collect droplets of mercury from both the regions.

MATERIAL AND METHODS

Materials required: *Hingula*, lemon juice, *Kharal* (mortar-pestle), water source, cloth piece, cotton, scissors, *Sharava* (earthen pot), *Nada-Yantra* (pitcher instrument), tray, coal, fire-gun.

Instrumentation of *Khalva-Yantra*

Table 1: Showing measurements of *Khalva -Yantra*

Parameter	*Kharal* (Mortar)	*Musal* (Pestle)
Length	Inner length- 12 inch Outer length- 14 inch	11.8 inch
Width	7.9 inch	-
Thickness	1 inch	-
Depth	Inner depth- 3.6 inch Outer depth- 6 inch	-
Circumference	-	8 inch (bottom part)
Diameter	-	2.9 Inch

Instrumentation of *Nada-yantra*

Table 2: Showing measurements of *Nada -Yantra*

Parameter	Value
Upper circumference	Outer region- 88 cm Inner region – 86 cm
Middle circumference	130 cm
Depth	29 cm

Instrumentation of *Sharava*

Table 3: Showing measurements of *Sharava* used for placing of bolus

Parameters	Value
Circumference	Outer- 68 cm Inner- 59 cm
Diameter	20.5 cm
Depth	8.5 cm

Instrumentation of tray

Table 4: Showing measurements of tray in which *Sharava* is placed

Parameter	Value
Length	Outer length- 49 cm Inner length- 46 cm
Width	Outer width- 32.5 cm Inner width- 30 cm
Depth	5 cm

Method- *Urdhwapatna* method is used in this research work to obtain mercury from *Hingula* in a standard way so that good yield can be gained.

Pharmaceutical study- Whole the study was done in following steps-

Collection of raw material

- 250.6gm *Ashudhha- Hingula* was purchased from Shree ram herbals, Jaipur. It get authenticated on the basis of their *Prashasta Lakshanas* (acceptable characters) such as *Shwetarekhah* (silver strips on fracture), *Pravalabho* (appearance like coral leaves)[8] *Bharpurno* (weighty)[9].
- Fresh lemons were purchased from local market and 200ml juice was extracted from 480gm. lemon. The juice was extracted manually. The pH of lemon juice was 2.

Purification of *Hingula*- *Ashudhha Hingula* was made into powder with the help of mortar and pestle. The process of trituration was done with lemon juice and after this it is allowed to get dry in sunlight. Total seven *Bhavanas* were given with *Nimbu Swarasa* (lemon juice). Obtained purified *Hingula* after this step is said to be useful in all the *Yogas* (formulations) undoubtedly[10].

Fig no.1: Raw *Hingula*

Table 5: Showing amount of lemon & trituration time

Day	Amount of lemon juice	Criteria to stop trituration	Time taken in the process of trituration
1st	45 ml	Till it get absorb completely	1 hour
2nd	30 ml	Till it get absorb completely	37 min.
3rd	25 ml	Till it get absorb completely	32 min.
4th	25 ml	Till it get absorb completely	25 min.
5th	25 ml	Till it get absorb completely	25 min.
6th	25 ml	Till it get absorb completely	22 min.
7th	25 ml	Till it get absorb completely	20 min.

OBSERVATIONS

The amount of lemon juice required for trituration gradually reduces.

During trituration, it gradually became sticky to pestle.

The color of *Hingula* was changing gradually during trituration, it get turned in *Kumkumprabham*[11] (reddish orange color) from *Japakusumsamkashama*[12] (bright red color).

Fig. 2: *Hingula Shodhana* through *Bhavana* method

Prakshalan or hydraulic wash was done for three times to remove acidity. After washing and drying in sunlight, 252.6gm *Hingula* was obtained.

Extraction and collection of mercury

Required materials- *Nada- Yantra*, coal, *Sharava*, cloth pieces, cotton pieces and fire gun are required.

This is the most important step of study. Whole the procedure was completed in following steps:

1) Take 14.2 gm. cotton cloth piece and 100 gm. cotton.
2) Evenly spread powdered *Hingula* on cloth piece and cover it from cotton pieces.
3) After this, fold the cloth obliquely and make a bolus like structure. The net wt. of bolus was 365.6gm.
4) Tie the bolus with strip of cotton cloth.
5) Place 345 gm. coal in the *Sharava*.
6) Ignite the coals with the help of fire gun till they become red hot, place the bolus in the center of *Sharava.*
7) Place *Nada* on stone piece and tilt the *Nada* from one side so that oxygen may enter easily. There is a serious caution in this step, as more tilting may cause loss of mercury in the form of vapors rather less spacing may hamper oxygen supply and coals will extinguish.
8) Take a wet piece of cloth and just put it on the top of *Nada*, to cool that area.
9) Appearance of yellow fumes of sulfur, during this period we must wet the cloth repeatedly to maintain temperature.
10) Almost after two hours fumes get diminished and within half an hour all the sulfur fumes get disappeared.
11) Whole the instrument left as it is to self- cool.

Observations

- Yellow and harsh fumes of sulfur started to come within 15 min. of starting of procedure.
- Fumes started to get disappear after two hours and completely disappeared just after next 30 minutes.

Fig. 3: *Parada Nishkasana* through *Nada Yantra*

Collection of Mercury

Next day patiently lift the *Nada*, so many droplets of mercury found onto the top of *nada*, with the help of cloth piece collect it. Some amount of mercury found in coal and ash, filter the ash from *Chaturguna* cloth (four layered cloth piece) to separate mercury. On squeezing, *Parada* comes in vessel from micro-pores of cloth and ash remains at topmost layer. Patiently open the cloth piece in tray because some amount of *Parada* may found in between the layers, collect these droplets in similar manner. Wash coals and ash with water and leave it for a while so that mercury get settle down, if there is any. Pack all the collected the mercury in tight container. The total amount of mercury found from 250.6gm *Hingula* was 192.30gm, which is 76.74%.

DISCUSSION

Chemically *Hingula* is HgS. *Hingula* is meant to the best ore of mercury as it contains 86% mercury in it[13]. So the maximum amount can be obtained from 250.6gm *Hingula* is 216.72gm For purification of *Hingula* lemon juice was taken as media, the gentle trituration and sunlight may helpful to loosen the bond of mercury and sulfur. It may be a possibility that better trituration may give better yield of *Parada*. The amount of required *Bhavana* material reduces gradually may be because of whenever the particle size reduces, the volume covered by material also reduces. The principle of *Bhavana Dravya* requirement is *Draven Yavata Dravyam Churnitam Tvadratamvrajet* (The amount of required *Bhavanadravya* should be sufficient to keep the material moist during the grinding process)[14]. The amount require as *Bhavana dravya* also depends upon weather [15].

Strong *Mardana* (trituration) is required to generate small amount of heat so that chemical reaction may get initiate and this applied force also helps in reduction of particle size.

The hydraulic wash helps to separate acidic media and the toxins on the basis of their different specific gravities.

The reason behind using some amount of cotton instead of cotton cloth is that, it is easy to get burn in comparison to cloth.

Proper ignition of coal is an important task otherwise *Hingula* contained bolus will not burn or will partially burn. Even placing of *Nada* over the *Sharava* hinders the oxygen supply and in that case partially burnt coals do not give good yield. Coals burnt with fire gun get easily turn into red hot, which will provide good heat for dissociation.

The heat provided to powdered *Hingula*, actually dissociates the bond of mercury and sulfur. During this reaction sulfur get turn into sulfur-di-oxide (SO_2 gas) and mercury get converted into mercury oxide. After some time or may be after attaining appropriate temperature the bond between mercury and oxygen again get break down and mercury start to sublimate in form of small globules. The sublimated

mercury stuck onto the top of *Nada* as it found less temperature there because of wet cloth.

Probable causes of loss

1) Some amount of mercury come out in the form of vapors from the instrument with fumes.
2) It was very time taking to collect very small droplets of mercury, so some amount get lost in this form.

Cost estimation

Material	Cost
Hingula	8300/-Kg
Lemon	60/-Kg (at that season)
Nada and *Sharava*	360
Cotton and cloth piece	60

Thus, total cost estimated for 192.30 gm. *Parada* was 2,555Rs.

CONCLUSION

Seeing the importance of *Rasa-aushadhies* (medicines of Indian alchemy), attaining *Shudhha Parada* (pure mercury) becomes a basic requirement. *Hingula* is the main source of *Parada* and scholars of Indian alchemy appreciated *Hingulothha Parada* very well. So according to classical guidelines, *Hingula* was treated to procure *Parada*. The method used for same was *Urdhawapatana* method and instrument was *Nada yantra*. 76.74% mercury found from 250.4gm *Hingula*.

REFERENCES

1. Prof. Sidhhinandana Mishra, Anandakanada of Shri Bhairava, Varanasi Chaukhmabha orientalia publications, 2015, Ch. 1, Verse 30, Page 4.
2. Prof. Sidhhinandana Mishra, Anandakanada of Shri Bhairava, Varanasi Chaukhmabha orientalia publications, 2015, Ch. 23, Verse 8, Page 466.
3. Pt.Bhagwaddattatamaja Rameshwardayalu Vajpayee, Rasahrudya Tantra of Shrimad Govind bhagvadapad acharya, Arthabodhini Hindi commentary, Varanasi Chaukhmabha orientalia publications, 2008, Ch. 1, Verse 10, Page 5.
4. Dr.Devendra Singh Gautama, Rasamrutam of YadavJi TrikamJi, Varanasi Chaukhmabha orientalia publications, 2008, Ch. 1, Page 6.
5. Prof.D.A. Kulkarni, Rasaratna Sammuchchya of Shri Vagbhattacharya, New Delhi, Meharchand Laxmandas publication, 1998, Ch. 3, Verse 142, Page 68.
6. Mehta N.J.et al, Standard operating procedure of Hingulottha Parada, International Journal of Ayurveda medicine, 2010, 2(1),27-36.
7. Bhudeb Mookerjee, Rasa-Jala-Nidhi, Varanasi Chaukhmabha orientalia publications, 1998, Vol. II, Ch. 3, Page 226-227.
8. Prof.D.A. Kulkarni, Rasaratna Sammuchchya of Shri Vagbhattacharya, New Delhi, Meharchand Laxmandas publication, 1998, Ch. 3, Verse 139, Page 68.
9. Pt.Kashinath Shastri, Rasatarangini of Shri Sadananda Sharma, Delhi, Motilal Banarasi Das, 2014, Ch. 9, Verse 3, Page no. 199.
10. Pt.Kashinath Shastri, Rasatarangini of Shri Sadananda Sharma, Delhi, Motilal Banarasi Das, 2014, Ch. 9, Verse 17, Page no. 202.
11. Prof. D.A. Kulkarni, Rasaratna Sammuchchya of Shri Vagbhattacharya, New Delhi, Meharchand Laxmandas publication, 1998, Ch. 3, Verse 143, Page 69.
12. Pt.Kashinath Shastri, Rasatarangini of Shri Sadananda Sharma, Delhi, Motilal Banarasi Das, 2014, Ch. 9, Verse 3, Page no. 199.
13. A Jain et al, New insights and rethinking of cinnabar for chemical and its pharmacological dynamics, Bioengineered 10 (1), 353-364, 2019.
14. Acharya Sharangdhara Mishra, Sharangdhra Samhita, Varanasi, Chaukhamba orientalia publications, 2018, Madhyam Khanda, Ch. 6, Verse 6, Page no. 178.
15. Vd. Raman Belge, Dr. Rameshwar Pandey, Dr. Prakash Itankar. Critical Review of Bhavana Processes with special reference to its Utility in Ayurvedic Pharmaceutics. J Ayurveda. Integr Med Sci 2019;3:126-131.

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