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EXTRACTION OF *PARAD* FROM *HINGULA*, A TRADITIONAL AYURVEDIC METHOD

Thakur Rakesh Singh[1*], Prashant Bedarkar[1], Biswajyoti Patgiri[1] and Saroj Parhate[2]

[1]Department of Rasashastra and Bhaishajya Kalpana including Drug Research, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University Jamnagar, Gujarat, India.

[2]Department of Rasashastra and Bhaishajya Kalpana, Government Ayurved College, Raipur, Chhattisgarh, India.

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***Corresponding Author**
Dr. Thakur Rakesh Singh
Department of Rasashastra and Bhaishajya Kalpana including Drug Research, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University Jamnagar, Gujarat, India.

ABSTRACT

Rasashastra is a branch of Ayurvedic science deals with manufacturing of mercurial, metallic and mineral medicinal formulation with dose, indications, contraindication with possible adverse effects if medicines were not used or properly prepared as per classics. Processed Mercury (*Shodhita Parad*) is one of the important ingredients of many Ayurvedic formulations. Ancient scholars always suggest *Parad* will be used for medicinal preparation purpose after *Ashtasanskarita* and *Samanya Shodhana* (Purification/detoxification). This study deals with extraction of *Parad* from processed *Hingula* (Cinnabar) by traditional *Naadyantra* method. This *Parad* will be used for different Ayurvedic medicinal preparations without *Ashtasanskarita* and *Samanya Shodhana*.

KEYWORDS: Ayurved, Extraction, Formulation, Mercury, *Rasashastra*.

INTRODUCTION

Ayurveda is one of the Indian traditional systems of medicine which uses processed natural products which can be of herbal, metallic, mineral and animal origin. *Rasashastra*, an integral part of Ayurveda exclusively uses various processed metals / minerals in therapeutics. In due course of time, herbo-mineral and metallic preparations occupied a significant place in

Ayurvedic therapeutics. *Shodhita Parad* (Purified mercury) is one of the essential component of *Rasaushadhies* (Herbo-mineral-metallic preparations) mentioned in Ayurvedic/*Rasashastra* classics.[1,2] The Ayurvedic literature claimed that Parad will be used for medicinal purpose only after *Ashtasanskarita* (Eight principles) and *Samanya Shodhana* (Purification/detoxification).[3] The *Ashtasanskar* and *Samanya Shodhana* process of *Parad* is tedious, time consuming and expensive procedure, to overcome these drawbacks, *Acharyas* of *Rasashastra* preferred using *Hingulottha Parada* i.e. *Parada* extracted from *Shodhita Hingula* is said to be equally potential to *Ashta samskarita Parada*.[4] In this study an attempt has been made to extract *Parad* from processed *Hingula* by following classical guidelines.

MATERIALS AND METHODS

Collection of raw materials: Authenticated raw *Hingula* (Cinnabar) was procured from Pharmacy, Gujarat Ayurved University, Jamnagar. *Nimbu* (*Citrus medica* Linn.) was collected from local market of Jamnagar.

Pharmaceutical preparation of extraction of *Parad* (Mercury) from *Hingula*

This section deals with extraction of *Parad* from *Hingula* followed by two steps i.e. (a) Purification of raw *Hingula*[5] (b) Extraction of *Parad* from processed *Hingula*.[6]

Purification of raw *Hingula*

In this step raw *Hingula* was made into fine powder by using mortar and pestle and then filtered in 60 mesh size sieve. The fine powder *Hingula* was then levigated (*bhavana*) with *nimbu swarasa* (lemon juice) for continuously 3 hours and then allowed to dry in same mortar. The product obtained after drying is called as *Shodhita Hingula* (Purified Cinnabar). The same process was repeated in three batches.

Extraction of *Parad* from purified *Hingula*

In this process equal quantity of white cotton cloth was taken to *Shodhita Hingula* and it was uniformly spread over it. The cotton cloth with *Shodhita Hingula* was rolled from both sides in opposite direction and made bolus like structure and was tied up loosely by a cotton thread. The bolus was placed in an earthen pot (mud *sharava*) and was placed at the center of a large steel tray. The bolus was ignited by candle and it was exposed to air for few minutes. When the ignition uniformly started after few minutes of exposure to air, then the *Sharava* was covered by a *Nada* fully on 3 small pieces of tiles which were put around the *Sharava*. The cotton bolus was allowed to burn continuously for 12 hours until it completely burned. After

self-cooling (approx. 24 hours), *Nada Yantra* was carefully removed and *Parada* was procured from its inner side with the use of small pieces of cotton cloth by scrapping. The ashes of burned cotton cloth were washed with hot water and collected *Parada.* Thus procured *Parada* was filter through cotton cloth and stored. The *Parad* obtained after filtered is called as *Hingulothh Parad* (Extracted Mercury from purified cinnabar). The same process was repeated in three batches.

RESULTS

Purification of raw *Hingula*: During the purification process colour of raw *Hingula* (dark reddish brown) changes to light reddish brown colour after adding *nimbu swarasa*. The shining of crystals was disappeared after giving *Bhavana.* The 1000 gm of raw *Hingula* was taken for purification in all the three batches. The average 200 ml of nimbu swarasa was sufficient to levigate 1000 gram of powdered raw *Hingula* for continuous three hours. The average 1004 gram of purified/processed *Hingula* was obtained after complete process of purification (Table 1).

Table 1: Results obtained during *Shodhana* of *Hingula*

Batch Code	*Ashuddha Hingula* (g)	*Nimbu Swarasa* (ml)	Duration of *Mardana* (h)	Weight of *Hingula* after *Shodhana* (g)
H_1	1000	200	3	1004
H_2	1000	200	3	1006
H_3	1000	200	3	1004
Avg.	**1000**	**200**	**3**	**1004**

Extraction of *Parad* from purified *Hingula*: After ignition the bolus of cotton cloth with purified *Hingula* burnt very slowly and the little amount of fumes were coming out with smell of sulphur from the space between the outer border of *Sharava* and lower border of *Nada*. This fume was accumulated at the inner side of *Nada* as liquid *Parada* which was procured by scrapping with cotton cloth. The 500 gram of *Shodhita Hingula* was taken in all the three batches to obtained *Parad*. The average 377.5 (75.5 %) gram of Parad was extracted at the end of this process (Table 2).

Table 02: Results obtained during *Parad Nishkasana,*

Batch code	*Shuddha Hingula* (g)	Cotton Cloth (g)	Obtained *Parada* (g)	Obtained *Parada* %
HP_1	500	500	380.0	76
HP_2	500	500	375.0	75
HP_3	500	500	377.0	75.4
Avg.		**500**	**377.50**	**75.5%**

Fig 1: Raw *Hingula.*

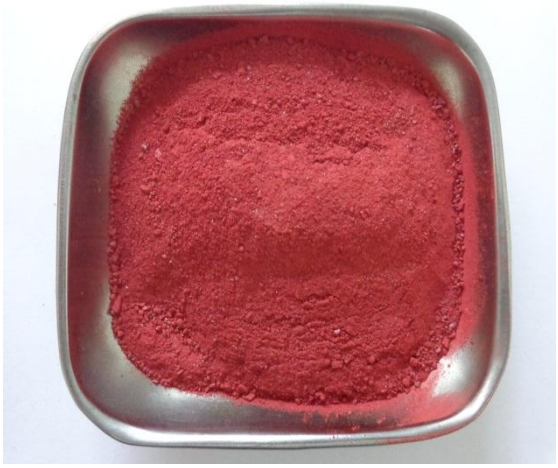

Fig 2: *Hingula* after *Shodhana.*

Fig 3: *Naadyantra.*

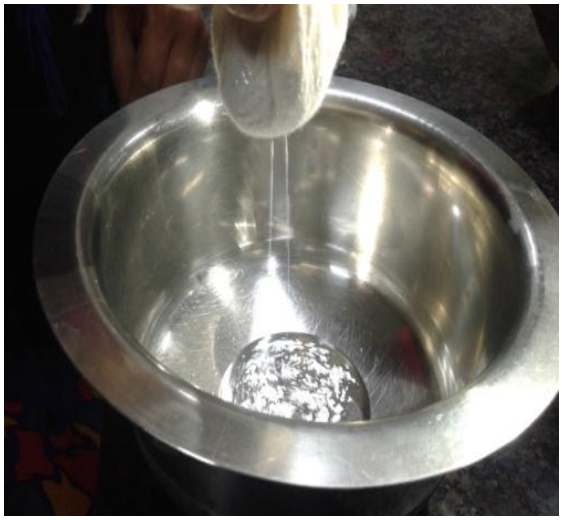

Fig 4: *Parad* after extraction.

DISCUSSION

Ayurveda, the science of life, is a comprehensive medical system that has been the traditional system of healthcare in India for more than 5000 years.[7] Rasashastra, an integral part of Ayurveda, deals with the drugs of mineral-metal origin, and details their varieties, characteristics, processing techniques, properties, therapeutic uses, possibilities of developing adverse effects and their management, etc. in a comprehensive way.[8] *Shodhana* mentioned in Ayurvedic classics is a mandatory preoperative procedure before using any substance (metals, minerals or poisonous drugs) as medicine. *Shodhana* is not only a purification process but it is considered as such modifications in substance that facilitates the pharmaceutical process, make a drug for easy for administration, devoid of any toxic effect and safe as well as effective.[9] *Shodhana* also make changes at physical, chemical and biological levels in the substance. Processed/purified *Parad* (Mercury) is one of the integral

parts of herbo-mineral or metallic formulations mentioned in Ayurvedic classics. Ayurvedic experts have estimated that 35-40% of the approximately 600 medicines mentioned in the Ayurvedic formulary may contain at least one metal. *Ashta samskarita Parad* or *Shodhita Parad* is preferred for any type of preparation such as *Rasasindura*, *Mallasindura*, *Aarogyavardhani Vati* etc. *Ashta samskarita Parad or Shodhita Parad* preparation is tedious, time consuming and expensive procedure, to overcome these drawbacks, *Acharyas* of *Rasashastra* preferred using *Hingulottha Parad* i.e. *Parad* extracted from *Shodhita Hingula* is said to be equally potential to *Ashta samskarita Parada*.[4] *Hingula* (Cinnnabar- HgS) is a compound of mercury; chemically it is mercuric sulphide. It contains approximately 86% of mercury, which can be extracted through sublimation process. Mercury obtained by sublimation is devoid of any impurity. During sublimation impurities like lead, tin are remain at bottom of sublimating apparatus. In pre-process of extraction of mercury from cinnabar, the purification of cinnabar is subjected with one bhavana of *Nimbu swaras* for continuous three hours; it loosens the HgS bonds and extracts mercury easily. The average 200 ml of *nimbu swarasa* was sufficient to levigate 1000 gram of powdered raw *Hingula* for continuous three hours. The average 1004 gram of purified/processed *Hingula* was obtained after complete process of purification it may because of addition of constituents of *Nimbu swarasa* during *bhavana* (Table 1). The pH of *Nimbu Swarasa* was 2.5. Citric acid present in *Nimbu Swarasa* may help for the disintegration of HgS. Organic acid, which may be responsible to form a ligand formation with HgS to weaken the bonds to facilitate dissociation of mercury. All these might be responsible for chemical detoxification and purification by forming a complex. Previously standardized method of *Parad Nishkasana* through *Hingula* was followed in this study.[10] In the next step dried *Shuddha Hingula* was spread over four folded cotton cloth. Weight of cotton cloth should be equal to that of *Hingula*. The idea behind this may be providing sufficient fuel needed to produce heat for complete extraction of *Parad*. A huge *Nada* is needed for collecting and cooling the *Parad* vapors. *Parad* collects on the inner surface of *Nada* which is collected by scraping. Vapor of mercury may also escape during the process; hence procedure should be done in open air and precaution to be taken by using mask and gloves. *Parad* globules deposited in *nada* were collected by rubbing with cotton cloth. The average 75.5 % gram of *Parad* was extracted at the end of this process (Table 2). 86.24 % of *Parad* is present in *Hingula* according law of definite proportion theory, so considering this as maximum possible yield (100%), 75.5% *Parada* was extracted with 10.74% loss was observed in current study. The yield of the study was on par with previous study conducted by Mehta N *et al*.[10] the reason of loss may be vapor mercury escaping from

space between *Sharava* & *Nada*, *Jala Gati* of *Parad* during washing and some amount of *Parad* remaining in the pores of the *Nada.*

CONCLUSION

Extraction of *Parad* from purified *Hingula* by applying *Nadayantra* (*Urdhwa Patan*) is one of the commonest methods to find *Parad* which is equal to Purified *Parad*/ *Ashtasanskarita Parad*. The average 75.5% *Parad* was extracted from *Hingula* in this study. This study also reveals that all the procedures and specifications to extract *Parad* by *Nadayantra* method which is useful to different Ayurvedic pharmaceutical industries.

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