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PARADASODHANA (PURIFICATION OF MERCURY) ACCORDING TO AYURVEDA PRAKASHA

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ABSTRACT

Rasashastra is a branch of *Ayurvedic* medicine which deals with formulations containing minerals/metals and significantly *Parada*. From the fact that the name of this branch has been given after *Parada* (*Rasa* in *Rasashastra*) indicates the emphasis laid by the then health care professionals on the use of Mercury or *Rasa* or *Parada* in the use of therapeutics. According to *Ayurvedic Formulary of India*, mercury is reported to be the widely used heavy metal. But nowadays, modern scientists are concerned with the use of heavy metals in *Ayurvedic* preparation. According to *Ayurveda*, before these metals are used for the treatment, purification process should be carried out so that the possibility of adverse effects gets eliminated. Present study deals with the purification of mercury mentioned in *Ayurveda prakasha* making it therapeutically potent. In *Rasa* classics, different methods are told for the sodhana of *parada*. Among them *Ashtasamskara* is a unique one. If one is not able to do *ashtasamskara* alone, then the method told in *Ayurveda prakasha* can be adopted. It includes *swedana*, *mardanas*, *murchana* and *urdhwapatanasamskara*. Acharya Sharangadhara also opines the same method for *paradasodhana*. Here total quantity of *parada* taken was 480 gm and the quantity obtained after *sodhana* was 173.5 gm.

Key words: Purification of mercury, *Ayurveda prakasha*, *paradasamskara*

INTRODUCTION

Rasashastra is existing since vedic period. It has also been reported that Buddhist sages were the first to use mercury and believed to be one of the creators of treatment by using metals and minerals in their appropriate form. Many drugs used for *rasayanachikitsa* (rejuvenation therapy) contain *Parada (rasa)* along with other metals. *Parada* is the most important drug in *Rasasastra*. The concept of *Rasasastra* itself is evolved from mercury. *Parada* is a very effective drug which is used as one of the important core ingredients in *rasaousadhies*. It balances all the three *dosas (vata, pitta and kapha)* of the body when processed properly. It exerts soothing effect on our body and hence prevents diseases. Some of its actions are *vrishya* (aphrodisiac), *balya* (tonic), *snigdha* (unctuousness), *rasayana* (rejuvenate) *vranashodhana* and *ropana* (wound healing), *krimighna* (antimicrobial) and *yogavahi*. The medicinal properties of certain herbs increase when compounded with *Parada*. It helps in achieving a stable mind and believed to be the best destroyer of the diseases. Preparations containing *Parada* can be given with sugar, powder of amla, ginger, lemon juice, like suitable vehicle.

Different *Rasa sastra* texts have classified *parada* into various varieties on the basis of colour and origin

Types	Colour	Caste	Karma
<i>Shweta</i>	White	<i>Brahmana</i>	<i>Swetakarma</i>
<i>Rakta</i>	Red	<i>Kshatriya</i>	Therapeutics
<i>Peeta</i>	Yellow	<i>Vaisya</i>	Used in alchemy and to prepare gold
<i>Krishna</i>	Black	<i>Shudra</i>	Used in maintaining health

Depending on the different places of availability, *parada* is of 5 types

1. *Rasa*
2. *Rasendra*
3. *Suta*
4. *Parada*
5. *Misraka*. These five words along with all the other names of Lord Siva are also considered as synonyms of mercury.

Type	Colour	Impurities	Uses
<i>Rasa</i>	<i>Rakta</i>	Free from all types of impurities	<i>Rasayana</i>
<i>Rasendra</i>	<i>Peeta</i>	Free from impurities	<i>Rasayana</i>
<i>Suta</i>	<i>Ishatpeeta</i>	With impurities	<i>Rogaharana</i>
<i>Parada</i>	<i>Sweta</i>	With impurities	<i>Sarvarogaharana</i>
<i>Mishraka</i>	<i>Mayurachandrik avarna</i>	With impurities	<i>Sarvasidhidayaka</i>

Sources of Parada-Parada is obtained in two forms: 1. *Muktaswarupa* (Native or free mercury), 2. *Yougikaswarupa* (In the form of ores). Different types of ores present are cinnabar (*Hingula*), meta cinnabar (*CarmaraHingula*), hepatic cinnabar (*Daradahingula*), coral ore (*Pravalabhahingula*), red oxide of mercury (*Girisindura*), calomel (Hg_2Cl_2), montrodite (HgO), living stonite, steel ore of mercury (*Jeklenka*), liver ore of mercury (*Jetrenka*). It is the only metal in liquid state which makes it unsuitable for use.

Doshas of parada- Mainly three types of *dosas* are explained in our classics; 1. *Naisargika dosha*, 2. *Yougika dosha*, 3. *Aupadika dosha*. Again these are subdivided into 1. *naisargika –visha, vahni, mala* 2. *yougika dosha-naga,vanga*, 3. *aupadika dosha-bhumija-parpati, Girija –patina, Varija-bhedi, Nagaja-dravi and malakari, Vangaja-andhakari and dhwankshi*

Paradasodhana- Samskara imparts specific qualities to the substances by specific process & increases bala and thejas. Ashtadasasamskaras are meant for dhatuvada and ashtasamskaras are for dehavada. *Samanya* and *viseshasodhana* are the two types of *sodhana*

Various methods of Samanya sodhana- 1. *Parada* is subjected to *mardana* with equal amount of *sudhachurna* for 3 days. Then it must be filtered through a two folded cloth. Then again it must

be rubbed with equal part of *lasuna* and half part *saindhava* till it attains black colour. After that it is washed with hot water and collected. 2. *Parada* is subjected to *mardana* with *kumariswarasa*, *chitraka*, *raktasarshapa*, *bruhatikvatha* and *triphalakvatha* for 3 days. By this *sapta mala* will be removed. 3. *Parada* is subjected to *mardana* in the mixture of *nagavalliswarasa*, *ardrakaswarasa*, *ksaratraya* for 3 days. It removes *sapta mala* of *parada*. 4. *Parada* is subjected to *mardana* in *sudhachurna* initially for 7 days and then followed by *mardana* in *haridrachurna*, *gruhadhuma*, *istikachurna* (1/16) for 3 days. 5. *Parada* is subjected to *mardana* with *guda*, *trikatu*, *yamini*, *lavanapanchaka*, *chitraka*, *triphalachurna*, *yavaksara*, *sarjaksara*, *tankana*, 1 part each. and the total quantity of all these drugs should be 1/20 th part of *parada* for 7 days. This is done for removing *saptakanchuka dosas*

Viseshasodhana

Name of <i>dosa</i>	Drugs	Process
<i>Naga</i>	<i>Dhooma</i> , <i>istika</i> , <i>haridra</i> , <i>urna</i> (R.T,R.M), <i>nimbuswarasa</i> (R.R.S), <i>kanji</i> (R.M)	<i>Mardana</i>
<i>Vanga</i>	<i>Mrugeshana</i> , <i>ankola</i> , <i>haridra</i> , (R.T,R.M,R.S.S)	<i>Mardana</i>
<i>Agni</i>	<i>Citraka</i>	<i>Mardana</i>
<i>Mala</i>	<i>Aragvadha</i>	<i>Mardana</i>
<i>Chapalya</i>	<i>Krshnadhatura</i>	<i>Mardana</i>
<i>Visha</i>	<i>Triphala</i>	<i>Mardana</i>
<i>Giri</i>	<i>Trikatu</i>	<i>Mardana</i>
<i>Asahyagni</i>	<i>Trikantaka</i>	<i>Mardana</i>

Suddhaparadalakshana *Suddhaparada* will internally have a blue shining and externally will be bright and shining like the afternoon sun. ***Asuddhaparadalakshana*** It will be *dhumavarana*

or *panduravarna*, such *parade* which is mixed with other colours should not be used for *rasakarma*.

RASADI PANCHAKA -*Rasa-shadrasa, Virya-usna, Guna-snigdha, Vipaka-madhura, Karma-yogavahi, rasayana, ativrushya, balya, vajeekara, drishtibalaprada, dehasidhikara, lohasidhikara, vranaropana and vranasodhana, krimighna, Dosa prabhava-tridoshaghna-Vyadhiprabhava-krimi, kushta, aksiroga, vataroga, valipalita, ksay, tridosajaroga, sarva rogahara and papajanyaroga.*

PATHYA APATHYA OF PARADA

Pathya Mudga, dugdha, Sali, saka, punarnava, meghanada, saindhava, sunti, padmamoola, jeraka, ardraka, hamsodaka. Apathya-ati madyapana, bhojana, sayana, ratrijagarana, krodha, kakaarashtakaganadravya, pithavardhaka-vatavardhaka ahara, kanji, takra. Vihara-jalakreeda, vyayama, vyavaya. Matra-according to rasatarangini, swarnajarithaparada-half ratti Ashtasamskaras of parada

Swedana, mardana, murchana, uthapanam, patanam, rodhanam, niyamanam, deepana are the *samskaras* commonly used for *dravya karma & rasayanakarma*. If one is unable to do all the *ashtasamskaras* alone, a method is told in *Ayurveda prakasha* in which we will get *parada* having excellent therapeutic properties. *AcharyaSharanagadhara* also opines the same method for *paradasodhana*.

A *musha* is prepared using *rajika* and *rasona* in which *parada* is taken for *swedanasamskara*. The liquid medium is *kanji*. After 72 hours of *swedana, mardana* is carried out in *kumariswarasa, chitrakakvatha, kakamachiswarasa and triphalakovatha* each for 24 hours. Then by taking half quantity of *saindhavalavana* and *nimbuswarasa, mardana* is done in *taptakhalva* for the next 24 hours. *Murchana* is carried out using *lasunakalka, rajikachurna* and *sodhitnavasada* for 72 hours in *taptakhalva* by adding *kanji* and attaining *pindeebhavam* (by adding *thutha*) *chakrikas* are made out of it. *Hingulepana* is done for *chakrikas*. Then in an earthen pot, *saindhavalavana* is spread and these dried *chakrikas* are spread, *sandhibandhana* is done properly and *urdwapatanasamskara* is carried out by giving *tivragnifor* about 9 hours. The upper pot is covered with a wet cloth. After *swangaseetha, parada* globules in the inner side of upper pot is scrapped well and washed well in hot *kanji*, this *parade* shows excellent therapeutic potency and hence can be used for preparing *rasoushadhis*.

MATERIALS AND METHODS

Parada was purchased from the market and the study was conducted at the *Rasasala* of the PG Department of Rasasastra & Bhaisajyakalpana of the MVR Ayurveda medical college, Parassinikkadavu, Kannur

1. **SWEDANA-Dola yantra** preparation-A mud pot which is 21 cm depth was selected. First day it is immersed in water, next day it is smeared with rice water and boiled with the same pouring into it. After that three coatings of *nagavalli swarasa* is done and dried well. Later, 7 coatings of mud smeared cloth was applied and dried under sunlight. *Amushais* made with *rajia* and *rasona*. 120 gm of *rajika* is made into fine powder and 120 gm of *lasunakalka* is made. Both of these were mixed well using *kanji* and moulded into *musha* shape, a lid was also made for this and dried well under sun for 7 days. *Parada* taken-480 gm. **DIMENSIONS OF MUSHA**-Height-4.5 cm without lid; 5 cm with lid, Weight-144.39 gm with lid; 129.60 gm without lid (after drying), Circumference-23 cm, Thickness-1.5 cm, Diameter-6.5 cm. **MUD POT FOR SWEDANA**-Height-18 cm, Weight-1762 gm, Depth-21 cm, Circumference-65 cm, Brim thickness-2 cm. **WEIGHT OF POTTALI**-649.5 gm. Initial pH of *kanji*-3.5, Initial temperature of *kanji*-30 degree celcius, Initially 5 litres of *kanji* is added, After 72 hours-*kanji* boiled with vapours, Colour-dark, cow dung green, Total *kanji* used-11.800 litres, pH-3.71

COLLECTION OF PARADA AFTER 72 HOURS-When the temperature reached 32 degree celcius, started *parada* collection. From banana leaf-454.5gm, From *musha*-24.5gm. Total 479 gm of *parada* was collected. Loss-1 gm.

2. **MARDANA**-Mardana with *kumari swarasa*-300 gm of the middle portions of *kumari* was taken and prepared the *swarasa* and *parada* is given continuous mardana for 24 hours in *khalwa yantra*. 100 ml of *swarasa* was added in total. There was no drying of *dravadravya*.

OBSERVATIONS

Time	Observations
Within half hour	Colour of <i>swarasa</i> turned from light green to greyish brown

After 1 hour	<i>Parada</i> appeared as globules, specific odour noted
After 2 hours	Smaller granules of <i>parada</i> appeared
After 12 hours	Colour of <i>swara</i> turned to cowdung in colour. finer globules found.
After 24 hours	Globules reunited and seen together

Mardana with chitrakakvatha- Sodhana of chitraka- Preparation of churnodaka- 125 mg sudhachurna is added to 4.5 litres of water (2 ratti:1 tola ratio) and kept aside for 9 hours. After that it is filtered and used for chitrakasodhana. *Chitraka* was cut into small pieces and kept immersed in *churnodaka* for 24 hours. After one day *sudhajala* was pinkish coloured. Sodhita *Chitraka* was collected and dried under hot sun. **Preparation of kvatha for mardana-** Ratio-1:8 reduced to 1/8. 200gm of *sodhitachitraka* is made into coarse powder form and added 1600 ml of water which is then reduced to 200ml. Continuous *mardana* in *chitrakakvatha* was given for 24 hours in *khalwayantra*.

Observations- After adding *chitrakakvatha*, *parada* again appeared as small globules. No specific changes are noted for the next 24 hours. The colour of *dravadravya* turned to dark brown. Quantity of *chitrakakvatha* used-100 ml

Mardana with kakamachiswarasa- 300 grams of *kakamachi* is weighed and crushed well. *Swarasa* is taken after squeezing through cloth. 120 ml of *swarasa* was prepared.

Observations- On adding *swarasa*, globules of *parada* reunited together and after 2 hours it again turned back to granules. After 24 hours the colour of *swarasa* was more dark in colour. *Parada* was seen clearly in the bottom of *khalwayantra*. 100 ml of *kakamachiswarasa* was used for 24 hours *mardana*

Mardana with triphalakvatha-Preparation of kvatha for mardana- 66.6gm each of *haritaki*, *vibhitaki*, *amalaki* is made into coarse form and boiled in 1600 ml of water and reduced to 200 ml. On adding *triphalakvatha*, foam appearance was observed in *khalwayantra*. *Parada* was seen as globules. After 24 hours of continuous *mardana*, *parada* is collected after thorough washing in hot water. 100 ml of *kvatha* was added for 24 hour *mardana* procedure. Quantity of *parada* regained after 96 hours of continuous *mardana* in 4 *dravadravyas*-476.5gm. Loss-2.5gm

3. MARDANA IN TAPTAKHALWA

Ingredients-*saindhavalavana*- half of *parada*- 238.25gm, *Dravadravya* for *mardana-nimbuswarasa*. 1600 gm of fresh nimbu is squeezed to obtain *swarasa*. 2.5 litres of *swarasa* is prepared. *Taptakhalwa* was mechanized with heating control system. RPM was fixed 38/minute. Temperature was set at 53 degree celcius. *Taptakhalwa* was switched on half hour before the procedure to attain the set temperature. *Parada* was transferred to *taptakhalwa*. *Saindhavalavanachurna* was added and 100ml of *nimbuswarasa* was added initially.

OBSERVATIONS DURING MARDANA SAMSKARA OF PARADA IN TAPTA KHALWA

TIME	OBSERVATIONS	TEMPERATURE(IN °C)
After 15 minutes	<i>Saindhava</i> joined with <i>parada</i>	54.4
After 2 hours	Freely flowing <i>parada</i> is seen as such	56.3
After 3 hours	<i>Swarasa</i> turned dark green colour	45
After 5 hours	Bubbles started appearing in <i>swarasa</i>	41.7
After 6 hours	<i>Parada</i> started to form globules	55.3
After 9 hours	<i>Parada</i> rejoined	43.2
After 11 hours	<i>Swarasa</i> became more dark in colour	49
After 12 hours	Quick drying of <i>swarasa</i> observed, added more <i>nimbuswarasa</i>	59.3
After 15 hours	Cowdung coloured <i>swarasa</i> seen	61.4
After 17 hours	<i>Parada</i> appeared as globules	50.2
After 19 hours	Finer globules of <i>parada</i> seen in both sides of <i>taptakhalwayantra</i>	56.6
After 20 hours	Foam appearance in <i>swarasa</i>	60.3
After 22 hours	Some freely flowing <i>parada</i> is seen	65.4
After 24 hours	Globular form of <i>parada</i> observed	56.1

Temperature of *taptakhalwa* is maintained between 40-65 degree celcius. *Parada* is collected after thoroughly washing in hot water and after filtering through cloth. Total quantity of numbuswarasa used-2010 ml. Quantity of *parada* collected after *mardana* in *tapta khalwa*-471.5 gm. Loss-5 gm

4. MURCHANA Murchana is done in *taptakhalwayantra* continuously for 72 hours.

Ingredients- *Rajikachurna* (finely powdered)- 471.5 gm, *Rasona kalka*- 471.5 gm, *Sodhitnavasadara churna*-471.5 gm, *Dravadravya-kanji*. *Taptakhalwa* was mechanized with heating control system. RPM was fixed 38/minute. Temperature was set at 53 degree celcius. *Taptakhalwa* was switched on half hour before the procedure to attain the set temperature. *Parada* was transferred to *taptakhalwa*. After that *rajikachurna*, *rasonakalka*, *sodhitnavasadarachurna* are added and 500 ml of *kanji* was added initially.

OBSERVATIONS DURING MURCHANA PROCEDURE

Time	Important observations	Temperature (in °C)
after 2 hours	Mixing of ingredients completely	49.3
After 10 hours	Tarry like consistency	50.8
After 16 hours	Watery consistency, quantity feels to be reduced	63
After 24 hours	No freely flowing <i>parada</i> noted	52.7
After 28 hours	Very soft to touch	37.7
After 36 hours	<i>Parada</i> seen as globules in the bottom of <i>taptakhalwa</i> separated from other <i>dravyas</i>	53.9
After 42 hours	More watery consistency observed	40.7
After 56 hours	Becoming thick	60.9
After 62 hours	Quantity feels to got reduce and became more thick in consistency	68.3
After 72 hours	<i>Pindeebhava</i> not attained, waited for another 4 hours and added <i>thutha</i> ; attained <i>pindatwam</i> .	56.2

Temperature maintained between 40-70°C, *Sodhita thutha* added-30 gm, *Totalkanji* added-5.740 litres, Number of *chakrikas* made-176, Weight of each *chakraika*-18.2 gm, Number of days took for drying-8 days, Total quantity of *hinguchurna* used-150 gm, Number of days took for drying of *hingulepitha chakrikas*-2 days

5. URDHWAPATANAM²⁴⁴

Preparatory procedures: *Forsandhibandhana*-*Lohakittam*-1 kg, *Dagdha tusha*-1kg, *Sukti churna*-1 kg, *Mrithika*-3 kg. These all are grinded with buffalo's milk(2 litres) for 8 hours to obtain a paste form. Weight of the upper pot-890 gm, Weight of the lower pot-1670 gm, *Saindhavachurna* taken-1.5 kg per one procedure, Number of *chakrikas* taken-18-25 *chakrikas* per procedure, Total weight after *sandhibandhana*-3960 gm. In the lower pot *saindhavachurna* is spread and over that *chakrikas* are placed one by one. The upper pot was placed and 7 layers of *sandhibandhana* is done and *tivragni* is given continuously for 9 hours. Temperature maintained between 350-600 degree celcius.

Yield of *parada* after each *urdhwapatana*

<i>Urdhwapatana</i>	No of <i>chakrikas</i> taken	Yield of <i>parada</i>
1	25	16.47 gm
2	18	11 gm
3	23	18.67 gm
4	26	26.27 gm
5	25	35.46 gm
6	23	20.5 gm
7	22	24.28 gm
8	14	10 gm
9	All <i>chakrikas</i> together	10.85 gm

Total quantity obtained-173.5 gm, Total quantity taken for *murchana*-471.5 gm, Loss after 9 *urdhwapatana*-298 gm, Total *parada* taken initially-480 gm, Total loss-306.5 gm,% of loss-63%

DISCUSSION

For paradasodhana, many methods are told in classics. One among those methods is mentioned in Ayurveda prakasha in which five samskaras of parada are carried out-swedana, mardana, taptakhalvamardana, murchana and urdhwapatana. Acharya says that the parada obtained by this method will have excellent therapeutic values. Here 10 palas (480 gm) of parada was taken for the procedure and the result was 173.5 gm of parada with 63% loss. The loss happened after swedana (1 gm) may be during washing in hot kanji, after mardana (2.5 gm) may be due to spillage during the procedure, after taptakhalwa mardana (5 gm), after murchana (may be when chakrikas are dried under hot sun) and after each urdhwapatana procedures. As mercury is very unstable liquid metal, the loss is obvious. The heat produced during mardana, murchana etc due to continuous friction in the khalvayantra along with uniform rise in the temperature may seize the impurities. Obtained mercury was bright and shiny white in colour. The impurities might have dissolved or absorbed in the various dravyas used along with parada in each procedure.

CONCLUSION

Parada is an excellent drug with lots of therapeutic attributes. Since it is obtained in an impure form, it should be processed well and made pure so that the medicines prepared with it can be safely administered with minimum dose and quicker assimilation in the body tissues. Following the classical reference in Ayurveda prakasha it took 7 months for the paradasodhana including the preparation of kanji. It yielded 173.5g/480 g of purified mercury. loss of 63 % was observed during the procedure.

Pictures showing paradasodhana

Preparation of musha



swedana procedure of parada



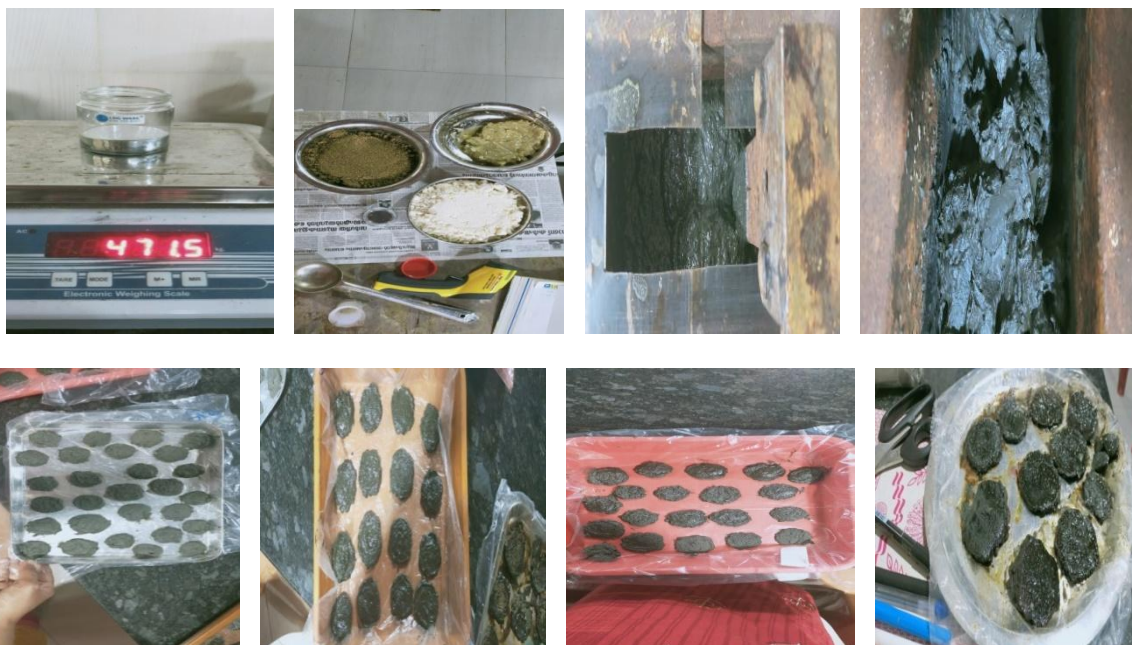
Mardana procedure



Taptakhalwamardana of parada



Murchana procedure



Urdhwapatana procedure



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