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# PHARMACEUTICAL STANDARDIZATION OF *RASAMANIKYA* – *KUPIPAKVA* METHOD

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## ABSTRACT

**Introduction:** *Rasamanikya* is Ayurvedic formulation which is contains heavy metal. It is prepared from single mineral of *Shuddha Haratala* heating through *Kupipakva* method. *Kushmanda Swarasa* has been preferred as media for *Shodhana* of *Haratala*. *Rasamanikya* name itself denotes the drug of Ruby color. **Aim*:*** To standardize the pharmaceutical procedure of *Rasamanikya* by *Kupipakva* method. **Material & Methods:** *Rasamanikya* has been prepared from *Kushmanda Swarasa Shodhita Haratala* through *Kupipakva* method using vertical Electric Muffle Furnace as heating device. Here *Rasamanikya* is prepared in three batches to establish the standard operating procedure. **Results & discussion:** Average 0.8 % w/w decreases in weight after *Shodhana* of *Haratala* by *Kushmanda Swarasa*. Average 99.66 % w/w yield was obtained of *Rasamanikya* prepared with *Kupipakva* method. **Conclusion:** In this study average 99.66 % w/w yield is obtained from 1500 g *Shuddha Haratala* required duration of heating 2 hours. *Rasamanikya* prepared by *Kupipakva* method has been taken has standard procedure for large scale preparation.

**KEYWORD:** *Haratala*, *Kupipakva rasayan*, *Rasamanikya*, Standardization.

## INTRODUCTION

The prime object of pharmaceutical process is to produce a safe, effective and quality drug. Efficacy and safety of drugs are depending solely on the quality of drugs and its manufacturing process. *Haratala* is one type of arsenical mineral and grouped under *Uparasa*.[1] *Haratala* is known as orpiment is an arsenical compound contains arsenic.

*Haratala* is classified under schedule E-1 of Drugs & Cosmetics Act 1940 that holds poisonous substances useful in therapeutics. To remove the impurities of drug for that *Peshanadi* means *Mardana, Kshalana, Nirvapanadi karma's* are done that is called *Shodhana*.[2] For efficacy & safety of drug proper *Shodhana* is very important.[3] Various *Shodhana dravyas* are described in classical rasa texts for a particular aspect and purpose. *Swedana, Bhavana* and *Kshipta* method are the procedures mentioned for *Haratala Shodhana.* Most of Acharyas were given prime preference to *Swedana* followed by *Bhavana* and *Kshipta* methods. *Kushmanda* is chief drug mentioned for *Shodhana* which is done by *Swedana* process. *Churnodaka, Kanji, Tila taila* and *Triphala jala* are other necessary media used for *Shodhana* of *Ashudhdha Haratala.*[4] Here the *Ashudhdha Haratala* is purified *by Kushmanda Swarasa* with the principle of *Swedana. Rasamanikya* is first described in Rasendra Chintamani by Dhundhuknath.[5] Rasa classics have described different methods of preparation of *Rasamanikya* i.e. *Sharava Samputa* method, *Abhrakha patra* method, *Valukayantra* method, bulb method etc. But the main principle behind each method is to melt *Haratala*, which gives *Manikya varna* to final product.[6] The aim of present study is to established the standard manufacturing procedure of *Rasamanikya* by *Kupipakva* method.

## MATERIAL AND METHODS

*Ashodhita Patra Haratala* was procured from Pharmacy Gujarat Ayurved University, Jamnagar. *Kushmanda* (*Benincasa hispida* (Thunb.) Cogn) fruits were purchased from local market of Jamnagar. *Haratala* was selected as per classical *Grahya lakshana*[7] and authentication of *Kushmanda* fruits were done through expert of Pharmacognosy laboratory of IPGT & RA.

**Methods:** *Rasamanikya*[8] was prepared in the 3 stages i.e**.** *Purvakarma* (*Shodhana* of raw materials), *Pradhana Karma* (involves processing of drugs in furnace) and *Paschat Karma* (breaking of *Kupi* and collection of product).

### Procedure

*Kushmanda* skin was peeled off and it was cut into small pieces. Then pieces were crushed in wet grinder and squeezed by cotton cloth to obtain fresh juice.

500 g of *Ashuddha Haratala* were kept in a muslin cloth and made into a *Pottali*, which was immersed in a steel vessel that is filled with sufficient quantity of *Kushmanda Swarasa*. Then the assembly was boiled on an induction electric heater for 3 h at 100$^{o}$ C throughout the

pharmaceutical process. After boiling for 3 h, *Haratala* were taken out from *Pottali* and washed with hot water for 3 times. Then it was allowed to dry in stainless steel tray. Same procedure was carried out for all three batches. After proper drying *Haratala* were collected and stored in glass container.

The beer glass bottle (750 ml) with 3 layers of *Kapadmitti* was used for preparation of test drug. The *Kupi* is now filled with powder (# 40) of '*Shuddha Haratala.'* Filled *Kupi* was kept in Electric Muffle furnace(EMF) for 2 h at 400$^{o}$C. After complete melting of *Haratala* and *Sheeta Shalaka* test was found positive, then EMF was switch off.

After self cooling, *Kupi* was taken out from EMF and clean the clay smear cotton cloth with the help of knife. After that kerosene oil soaked cotton cloth thread was tied one inch upper part of final product of *Kupi*. Then thread was ignited and allowed to burn completely and sprinkling of water on ignited *Kupi* which is causes breaking of *Kupi*. Final yield (*Rasamanikya*) was collected from the bottom of the *Kupi* and stored in airtight container.

## OBSERVATIONS AND RESULTS

The color of *Kushamanda Swarasa* was light green and watery in consistency. Average 52.66% v/w *Swarasa* was obtained by raw *Kushmanda*. Dull yellow *Haratala* turned in to shiny yellow after *Shodhana*. The color of media was converted into dark yellow color from whitish color after *Shodhana*. Boling of media was started in 20 minutes and whitish fumes were start too observed after 25 minutes and continued till end of the process. Totally, 2 *l* of *Kushmanda Swarasa* were utilized for one batch throughout the process. Average 0.8 %w/w loss of weight was observed after *Shodhana* of *Haratala*.

**Table 1: Details of observations and results obtained during preparation of *Kushmanda Swarasa.***

| Batches | Quantity | | |
|---|---|---|---|
| | ***Kushmanda* (kg)** | ***Kushmanda Swarasa* (*l*)** | **% yield (v/w)** |
| 1 | 5 | 2.4 | 48 |
| 2 | 5 | 2.8 | 56 |
| 3 | 5 | 2.7 | 54 |
| **Avg.** | **15** | **7.9** | **52.66** |

**Table 2: Details of observations and results of *Ashudhdha Hartala Shodhana.***

| Sr. No. | *Ashuddha Haratala* | *Kushmanda Swarasa* Vol.(*l*) | Duration in hour | Temp.($^{o}$C) | *Shuddha Haratala* | % of loss (w/w) |
|---|---|---|---|---|---|---|
| 1 | 500 | 2 | 3 | 100 | 497 | 0.6 |
| 2. | 500 | 2 | 3 | 100 | 496 | 0.8 |
| 3. | 500 | 2 | 3 | 100 | 494 | 1.2 |
| Avg. | 500 | 2 | 3 | 100 | 99.13% | 0.86% |

**Observations of pharmaceutical procedure of *Rasamanikya***

The setting peak temperature i.e. 400$^{o}$C of EMF was reached within 20 minutes. White fumes were observed after 10 minutes and continue till end of the process. Melting of the *Haratala* was started after 30 minutes. Complete melting of *Haratala* was observed after 2 h of heating which was confirmed by *Sheeta Shalaka*. Average 0.34 %w/w loss was observed during pharmaceutical process of *Rasamanikya*.

**Table 3: Average observations during preparation of *Rasamanikya* (three batches).**

| Time (Hr:Min) | Observed Temp(˚C) | Observations |
|---|---|---|
| 00:00 | 69 | Furnace started. |
| 00: 10 | 283 | Mild white fumes started |
| 00:20 | 384 | Fumes increased |
| 00.25 | 402 | Yellow fumes started , sulphurous smell coming out |
| 00.30 | 406 | Melting started on the wall |
| 00.35 | 407 | Dense fumes was observed |
| 01:00 | 409 | Melting continue |
| 01:15 | 406 | Mud like consistency, orange tinge of *Sheeta shalaka* |
| 01:30 | 403 | Melting continue with dense fumes |
| 01:45 | 404 | Fumes decreased |
| 02:00 | 403 | Complete melting , & *Sheeta shalaka* test positive |

**Table 4: Result of obtained during preparation of *Rasamanikya.***

| Sr. No. | Duration of heating and temperature | | | *Rasamanikya* | |
|---|---|---|---|---|---|
| | Wt. of *Shuddha Haratala* (g) | Completion | | | |
| | | Time (hrs.) | Temp$^{0}$C | Wt (g) w/w | Colour |
| 1. | 600 | 2 | 400 | 598 | Ruby red |
| 2. | 600 | 2 | 400 | 598 | Ruby red |
| 3. | 600 | 2 | 400 | 598 | Ruby red |
| **Avg.** | **600** | **2** | **400** | **99.66 %** | - |

**Table 5: Organoleptic characters of *Shodhita Haratala* & *Rasamanikya.***

| Character | *Shodhita Haratala* | *Rasamanikya* |
|---|---|---|
| Colour | Shiny yellow colour | Blackish Ruby colour |
| Taste | - | Tasteless |
| Smell | Characteristic smell of *Haratala* | Odourless |
| Touch | Rough in touch | Glossy with smooth in touch |

**Table 6: Physico-chemical parameters of *Shodhana* media before and after *Shodhana.***

| Parameters | *Kushmanda Swarasa* | |
|---|---|---|
| | **Before *Shodhana*** | **After *Shodhana*** |
| pH | 5.9 | 6.83 |
| Specific Gravity | 1.01486 | 1.03024 |
| Total solid content (%w/w) | 0.1249 | 1.23 |

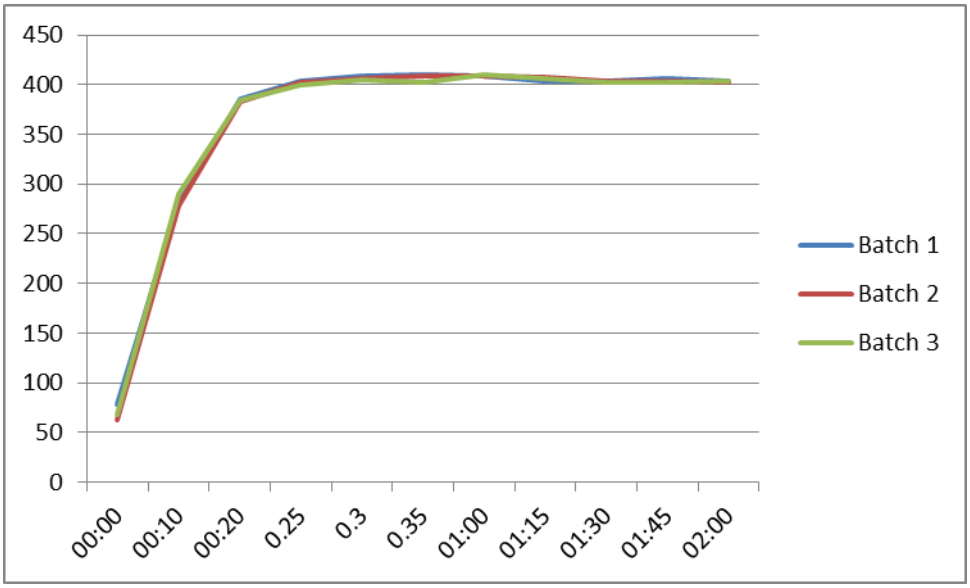



**Chart 1: Temperature pattern for preparation of *Rasamanikya.***

## DISCUSSION

*Samsakara* is defined as transformation of inherent attributes of a substance which leads to the addition of new properties. Among them *Swedana Samsakara* is *Toyagnisannikarsha Samsakara*.[9] Average 52.66% v/w *Swarasa* was obtained from raw *Kushmanda*. *Ashuddha Haratala* was make coarse powder before *Shodhana* process to proper exposure the materials with liquid media boiling in *Kushmanda Swarasa*. 2 *l Kushmanda Swarasa* is sufficient for 500 g of *Ashudhdha Haratala* for *Swedana* process (3 h of duration) in 2.5 *l* capacity of cylindrical stainless steel vessel. Amount of liquid media may be varies, according to the size and shape of the vessel.

After *Shodhana* procedure colour of *Kushmanda Swarasa* was changed from white to dark yellow color. It may be chemical reaction of *Haratala* (arsenic compound) with *Kushmanda Swarasa* during boiling process. Total solid contents of *Kushmanda Swarasa* was observed 1.23% w/v after *Shodhana* process as compared before *Shodhana* i.e. 0.1249% w/v (table 6). It may be due to addition of solid content of the *Haratala* which are dissolved in liquid media during *Swedana* process. In present study *Rasamanikya* was prepared in *Kupipakva* method,

because it is easy to prepare in large scale level and less time consuming. Now a day's Ambar glass beer bottle are used as *kanchkupi*, due to their special shape, size, heat resistant quality and easy sublimation of final product properly.[10] Now a day's Electric Muffle Furnace is used instead of *Valukayantra*, to provide the heat, because it is easy to handle & to maintain the temperature for specific period as per requirement.[11] The melting point of *Haratala* is $300^0$C to $400^0$C.[12] In present study melting of *Shuddha Haratala* was started an average of $402^0$C which was required average 25 minutes (table 3). Complete melting was observed after 2 h of heating at that time average temperature was $402^0$C which was confirmed by *Sheeta Shalaka* test (table 3). The colour of the *Sheeta Shalaka* was observed orange tinge colour which is indication of complete formation compound (fig. 18). After self cooling compact, ruby red color crystalline mass with shiny appearance was observed which was similar in *varna* described by the classical rasa texts. Average 99.66%w/w yield of was obtained of *Rasamanikya* which means that minor loss was obtained in final product. It was because in this adopted method of *Kupipakva*, *kramavridhdha Agni* was not followed. So, there is less chances to lose material in final product. This *Kupipakva* method is more preferable as compared to other classical methods with advantages of safe, easier, well maintained heat and large scale production. This method of *Rasamanikya* preparation was very less preferable by industries. So, there is need to standardize this method and present study will contribute for further pharmaceutical standardization.

## CONCLUSION

In present study, 99.66% w/w yield was obtained from each batch (3 batches) of 600 g *Shudhdha Haratala* having duration of heating 2 hours with maximum $400^0$C temperature. Set Temperature was decided as per melting temperature of *Haratala* ($300^0$C to $400^0$C) because melting of *Haratala* is the basic stage for preparation of formulation *Rasamanikya*. The current observation can be considered as Standard Manufacturing Procedure for future. It will also be helpful in future for further pharmaceutical researches. This adopted *Kupipakva* method with maximum yield will be helpful to industries.

**Plate 1: Unit operative procedure of *Haratala Shodhana.***

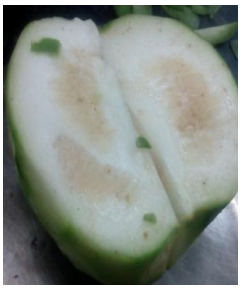
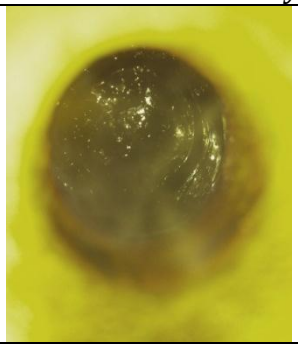
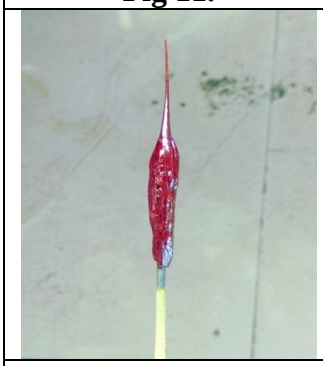
| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| **Fig 1.** | **Fig 2.** | **Fig 3.** | **Fig 4.** | **Fig 5.** |
|  |  |  |  |  |
| **Fig 6.** | **Fig 7.** | **Fig 8.** | **Fig 9.** | **Fig 10.** |

**Plate 2: Unit operative procedure of *Rasamanikya.***

| | | | |
|---|---|---|---|
|  |  |  |  |
| **Fig 11.** | **Fig 12.** | **Fig 13.** | **Fig 14.** |
|  |  |  |  |
| **Fig 15.** | **Fig 16.** | **Fig 17.** | **Fig 18.** |

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