

ORIGINAL RESEARCH ARTICLE

Standardization and Qualitative Parameters for Large Scale Production of Panchamrita Parpati - An Ayurvedic Drug

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ABSTRACT

Panchamrita Parpati is one of the most prescribed drugs from Ayurveda system of medicine. It is prepared by using special type of heating pattern to the mixture of Gandhaka (sulphur), Parada (mercury), Lauha Bhasma (incinerated iron), Abharak Bhasma (incinerated mica) and Tamra Bhasma (incinerated copper) in a specific ratio of 16,8,4,2 and 1. Methods for the preparation of Parpati are described in the classical literature of Rasashastra, but they are useful only for the laboratory scale production. For the large scale production it needs some modifications. Here an attempt is made to modify the method for the large scale production of Parpati preparation with the special reference to Panchamrita Parpati and tried to standardize the method. It was found that after these types of modifications Panchamrita Parpati was prepared quickly and easily with an average yield of 86.02% from the raw materials.

Key words: Panchamrita Parpati, standardization, Parada, Gandhaka, Bhasma.

INTRODUCTION

Panchamrita Parpati is a metallic drug of Ayurveda system of medicine. It is a drug of choice for the diseases like Grahani, Aruchi, Chardi, Dusta Arsas, Atisara, Raktapitta, Kshaya, Valli-Palitaroga and Netraroga with having Agnidipaka, Vrishya and Sthulatahar properties.¹ In Ayurveda, a method of formulation preparation, in which metallic flakes is formed by pouring molten metal over the leaves of plants is called Parpati. Due to its similarity with Parpata (seed of Butea monosperma) it is also called Parpati.² Parpati are two types³ i.e. Sagandha, which contains Gandhaka (Sulphur) and another type is Nirgandha, in which Gandhaka is not found as an ingredient. Eleven types of references are found for the Panchamrita Parpati in Ayurvedic classics.⁴ Here reference of Bhaishajya Ratnavalli is adopted in which Gandhaka (sulphur), Parada (mercury), Lauha Bhasma (incinerated iron), Abharak Bhasma (incinerated mica) and Tamra Bhasma (incinerated copper) are used as ingredients in the ratio of 16, 8,4,2,1 to prepare Panchamrita Parpati.⁵ These five ingredients are

generally known as Panchamrita due to having nectar like properties for the desired person.

Ayurveda is practiced since thousands of years and physicians were prepared medicines by themselves as per their requirement. But now a day due to the commercialization, medicines are prepared in pharmacies. Ayurveda drug manufacturers should make the further development of the existing formulations by use of technologies and modern age scientific parameters. An average approx 15kg Panchamrita Parpati is required for annual supply for two hospitals attached to the university, so here it was planned to modify classical method for 15 kg preparations of Panchamrita Parpati and for the ensure of quality some organoleptic and physicochemical parameters were also carried out.

MATERIAL AND METHODS

To develop the Standard Operating Procedure of Panchamrita Parpati - prepared Samgana Kajjali (16 parts), Suddha Gandhaka (8 parts), Lauha Bhasma (4 parts), Abharak Bhasma (2 parts) and

Tamra Bhasma (1 part) were procured from Pharmacy of Gujarat Ayurved University. Those were mixed in end runner for an hour (Fig 1 & 2). Fixed quantity of this mixture i.e. 1 kg was heated on gas stove in a steel pot to melt it (Fig 3). This melted material poured on enamel tray, which was put inside water, and was spread to immediate cooling (Fig 4). After cooling, Parpati was taken out from the tray and again made into powder form through end runner. Prepared Panchamrita Parpati was analyzed by using different organoleptic parameters and classical tests like Nirdhoomatva, Jwala pariksha, Varitartva. Modern physicochemical parameters like Ash value, Sulphated ash, Acid insoluble ash, Water soluble ash, Water soluble extractive, Alcohol soluble extractive, Carbon disulphide extractive, Petroleum ether extractive, pH, Loss on drying at 100 °C were performed of Panchamrita Parpati. Percentage of mercury and Particle size of powder form etc also were done.



Fig 1: triturating of ingredients in end runner



Fig 2: Mixture after trituration



Fig 3: Melted mixture of Panchamrita Parpati



Fig 4: Immediate cooling of melted mixture of Panchamrita Parpati

RESULTS AND DISCUSSION

The growing demand of Ayurvedic formulations in the national and international market needs uniform, easy, fast and safe drug manufacturing. To maintain the quality and quantity of material, process and product, it becomes necessary that industry should use the modern scientific tools and technology.

A sulfide of many metals is generally less toxic compared to its oxide or chloride, being relatively less soluble in body fluid.⁶ Various therapeutic qualities are achieved by mixing of mercury and sulphur. These therapeutic qualities can be potentiated with the addition of certain other materials like Bhasma of Gold, Silver, Copper, Iron etc. But these qualities are achieved after some pharmaceutical processes. One of such Ayurveda pharmaceutical process is preparation of Parpati.

The name "Parpati" is given to this preparation due to its form and the method of preparation as it is made in the form of thin flakes, by pressing the melted material between two surfaces. Panchamrita Parpati was nomenclature basing upon number of the chief ingredients i.e. five ingredients and its shape i.e. flakes shape. In Ayurveda classics, as per the need of the patients and availability of the raw drugs, more than one reference are found for some formulations. Nine types of References of Panchamrita Parpati are given in Rasa Yoga Sagar.⁷ Here method of Bhaishajya Ratnavalli is adopted as this book is mentioned in schedule book of Drug & Cosmetic act⁸ and also this reference is available in Ayurvedic Formulary of India.⁹

As per classical general method for the preparation of Parpati, Suddha Parada (Purified Mercury) and Shuddha Gandhaka (purified Sulphur) are taken in a Khalwa (mortar) in prescribed proportion and are triturated well till it

becomes as Kajjalabhasa (Just like Kajal – blackish in colour), Slakshnata (smoothness), Anjana sadrusa sukshma (minute as anjana), Rekhapurnata (very fine powder). Other drugs Lauh Bhasma, Abharak Bhasma and Tamra Bhasma are added one by one and mixed well by triturating in the Khalwa (mortar) for 3 hours. Later a cow-dung is placed over the floor and is made as platform. A piece of Kadali leaf or Eranda leaf is placed over it. The total triturated mixture is taken in a Lauh Darvi (iron vessel) and is melted over wood fire (mild heat). When it is converted into melted state, it is taken off from the fire and poured carefully on the leaf placed over cow-dung. Another leaf is covered over the melted mixture and spread it with gently pressed. After cooling the flakes of the Parpati are taken out, powdered and preserved.

Above method is easy and useful for the small scale but due to the commercialization and need of present era, this method is changed to some aspect to make large scale production. To develop the standard process, all the process should be repeated for minimum three times and data of the process should be recorded in proper manner.

Samguna Kajjali was blackish¹⁰ and Suddha Gandhaka was yellow¹¹ in colour. Lauh Bhasma, Tamra Bhasma and Abharak Bhasma were reddish violet (Jambuvat), black and brick powder like colour respectively.¹² Prepared Samguna Kajjali is directly taken which save time. As per the reference, Suddha Gandhaka is double than the Suddha Parada, so here Suddha Gandhaka is added in half amount of Kajjali. After that other Bhasmas are added and triturating process is done for an hour instead of 3 hr because 1 hr time was found sufficient in end runner machine for proper mixing. Average 138.5 g of loss for mixing 5037.5 g of material is found due to flying fine particles in air and sticking mixture into the end runner (**Table 1**).

After mixing, mixture was heated in 14 batches of 1 kg and last batch of 697g. Melting time, weight of product, percentage of product was given in (**Table 2**). For the melting of 1000 g of mixture of Panchamrita Parpati average 13.64 minute of time is needed on medium flame of gas stove. Average 194.14 °C temperature is found sufficient for the melting of mixture. There is approx half amount of Gandhaka in the mixture, and melting temperature of Gandhaka is 119°C, but due to presence of Bhasmas in the mixture it takes more temperature than the Gandhaka.

Variation in certain range of duration (12 – 16 minute) and temperature (182 – 204 °C) during pharmaceutical operation of Panchamrita Parpati were unable to demonstrate appreciable differentiation in morphological characteristics and tests of perfectness as described in ancient Rasa granthas.

Use of cow dung is indicated for the immediate cooling of the melted mixture. As per classical reference leaves of plant are used for immediate cooling and separation of mixture from the cow dung. Here enamel tray has been used and placed in a big tray filled with water to follow the both aims i.e. immediate cooling and separation.

Average 89.13 % of Panchamrita Parpati is collected after heating process. This loss is found due to sticking of material in vessels and some amount of Gandhaka exhausted as fume during the heating process.

Finally after powdering process, 13 kg of Panchamrita Parpati is collected. This loss is due to sticking of Parpati in end runner and fine powder of Parpati fly over from the machine during powdering process. So finally 86.02% of Panchamrita Parpati has been found from initial raw material.

Sulphur is very sensitive to heat treatment which changes allotropic forms as well as forms multiple sulphides continuously gets oxidized during successive heating. It is only the heat treatment which is responsible for differentiation in between Dhatu Kajjali (combined triturated raw material for respective type of Parpati) and Parpati from same drug.

Due to the modification in method, classical pharmacological characteristics may be changed. Changes in chemical composition might be noticed with the help of organoleptic and physicochemical parameters. These could be also useful to reproducibly monitored for specific operating procedure. Hence those observed and cited in (**Table 3**).

Organoleptic parameters show Panchamrita Parpati is brownish black powder. It is due to colour of ingredients. Odour of SO₂ on grinding is felt due to Gandhaka. Results of Nirdhoomatva and Jwala pariksha indicate presence of sulphur in the Parpati.

One of the possible explanations for Varitaratva (good floatability) of the prepared product in Churna form may be highest proportion of

Gandhaka which might form thin layer over water surface enabling other particles to float.

Particle size proves fineness of Panchamrita Parpati and due to its fineness it is found Varitara also. Decrease in particle size and increased in surface area leads to enhanced dissolution rate, which helps in rapid absorption of a drug.¹³ This further increases the bioavailability of the drug,¹⁴ this may be the probable reason for the drug of Rasashastra being quicker in action and more potent even at lesser dose.¹⁵

Size reduction is an important aspect which may influence percent and pattern of absorption, dissolution, site of absorption and many processes involving assimilation of the drug which might change further pharmacokinetic leading to variation in pharmacologic actions. Hence it has to be micronized before clinical administration.

Percentage of mercury is found 26% in analysis. Theoretically it is added only 25.80%. But these both are almost nearer.

Table 1: Data of triturating process of Panchamrita Parpati

| Batch | Samguna Kajjali (g) | Suddha Gandhaka (g) | Lauh Bhasma (g) | Abharak Bhasma (g) | Tamra Bhasma (g) | wt of mixture (g) | After triturating wt of mixture (g) | Loss due to process (g) |
|---------|---------------------|---------------------|-----------------|--------------------|------------------|-------------------|-------------------------------------|-------------------------|
| 1 | 2600 | 1300 | 650 | 325 | 162.5 | 5037.5 | 4903 | 134.5 |
| 2 | 2600 | 1300 | 650 | 325 | 162.5 | 5037.5 | 4892 | 145.5 |
| 3 | 2600 | 1300 | 650 | 325 | 162.5 | 5037.5 | 4902 | 135.5 |
| Average | 2600 | 1300 | 650 | 325 | 162.5 | 5037.5 | 4899 | 138.5 |

Table 2: Data of heating process of Panchamrita Parpati

| Batch | Wt of mixture (g) | Time taken for melting (minute) | Melting temperature (°C) | Wt of prepared product (g) |
|-------------------------|-------------------|---------------------------------|--------------------------|----------------------------|
| 1 | 1000 | 14 | 196 | 902 |
| 2 | 1000 | 12 | 184 | 910 |
| 3 | 1000 | 13 | 182 | 891 |
| 4 | 1000 | 15 | 200 | 895 |
| 5 | 1000 | 12 | 188 | 889 |
| 6 | 1000 | 16 | 204 | 904 |
| 6 | 1000 | 14 | 200 | 899 |
| 8 | 1000 | 13 | 196 | 900 |
| 9 | 1000 | 12 | 196 | 904 |
| 10 | 1000 | 13 | 192 | 902 |
| 11 | 1000 | 14 | 194 | 900 |
| 12 | 1000 | 15 | 196 | 880 |
| 13 | 1000 | 13 | 192 | 897 |
| 14 | 1000 | 15 | 198 | 905 |
| 15 | 697 | 12 | 192 | 522 |
| Average of 1-14 batches | 1000 | 13.64 | 194.14 | 898.42 |

Table 3: Data of qualitative parameters of Panchamrita Parpati

| Name of Parameters | Result | |
|---|---|---|
| Organoleptic characters: | | |
| Appearance | Brownish black powder | |
| Odour | Odour of SO ₂ on grinding | |
| Taste | Specific | |
| Classical characters: | | |
| Nirdhoomatva – open tube test (after heating) | Milky white & yellow, brownish black sublimate at upper end of tube – sequentially from top to down. Smell of SO ₂ – positive (+) | |
| Jwala pariksha | Burns in open air with bluish violet flame and red glow residue at bottom. Melts on heating & brownish solid on cooling | |
| Varitartva | 100% floats over water at 27°C | |
| Physicochemical parameters | | |
| Acid insoluble ash | 15.78% | |
| Water soluble ash | 03.5% | |
| Water soluble extractive | 0.98% | |
| Alcohol soluble extractive | 0.84% | |
| Carbon disulphide extractive | 39.12% | |
| Petroleum ether extractive | 4.92% | |
| Benzene extractive | 26% | |
| Loss on drying at 100°C | <1.23% | |
| pH of mixture (1 gm in 10 ml) | At 3 min – 5.35 At 10 min – 5.53 | At 24 hr – 5.55 At 36 hr – 5.55 |
| Others: | | |
| Particle size | Sieve no 40 100 200 400 | Passed through 100% 75.3% 50.08% 32.78% |
| Percentage of Mercury | 26.0% | |

CONCLUSION

Classical method and parameters for the Panchamrita Parpati are useful for the small scale production. By using modern technology it is possible to prepare large amount of Panchamrita Parpati in less time and efforts. Here by this effort of standardization and qualitative parameters for large scale production of Panchamrita Parpati is prepared (86.02%) very easily and in less time duration.

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