Pharmaceutical Standardisation

Pharmaceutical study of Triguna and Shadguna Balijarita Makaradhwaja

Shraddha N. Dhundi, Biswajyoti Patgiri¹, Pradeep Kumar Prajapati², Vinay J. Shukla³, B. Ravishankar⁴
PhD Scholar, ¹Associate Professor, ²Professor and Head, Department of Rasa Shastra and Bhaishajya Kalpana including Drug Research, ³Head, Pharmaceutical Chemistry Laboratory, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, Gujarat, ⁴Director, Research and Development, SDM College of Ayurveda, Kuthpady, Udupi, Karnataka, India

Abstract

Makaradhwaja is a herbo-mineral drug prepared by Kupipakwa method. In the present study Makaradhwaja was prepared by Triguna and Shadguna Balijarana using Ashtasamskarita Parada. Total five batches of Triguna Makaradhwaja (TM) were prepared by taking 330 g of Kajjali in each batch, average product obtained was 29.12 g. In the preparation of Shadguna Makaradhwaja (SM) too, five batches were prepared, taking 250 g of Kajjali, average product obtained was 16.8 g. The average time taken for flame in TM was 3.01 h and that in SM was 4.58 h. Kupipaka was carried out for 18 and 36 h in TM and SM, respectively. Inductive Coupled Plasma – Optical Emission Spectrometry (ICPOES) revealed the presence of 7.2976 ppm gold in TM, whereas 663.14 ppm in SM.

Key words: Ashtasamskarita Parada, Parada, Balijarana, Makaradhwaja, Murcchana

Introduction

Makaradhwaja is a type of Galastha (product sublimed at the neck of glass bottle), Sagandha (having sulfur as a component), Rasa Murechana (a compound formulation having processed mercury as a ingredient) prepared by Kupipakwa method (gradual heating of mixture of drugs in glass bottle), adopting two references [for Triguna Makaradhwaja (TM) and Shadguna Makaradhwaja (SM)] of Bhaishajya Ratnavali by a very specialized heating system, that is, Kramagni (subsequent increasing temperature) manner by vertical Electrical Muffle Furnace (EMF), which is a modification of Valuka Yantra. Triguna and Shadguna Balijarana were carried out using Ashtasamskarita Parada (processed mercury) [Figure 1]. Jarana is a process in which Parada consumes Swarna, etc., by various processes with heat through Vida, Valuka, and Kacchapa Yantra. It means after distillation and straining, the consumed substance like Abhraka (mica), Swarna (gold), etc., does not remains distinct and Parada remain in its preceding state and its weight also does not change. A specific process after which Parada is used for therapeutic purposes is known as Parada Murechana. It is a process in which Parada with or without Gandhaka is converted into suitable compound, which is classified in to Sagandha Murcchana (processed with Gandhaka) and Nigandha Murcchana (processed without Gandhaka). The Sagandha Murechita Yogas are widely used in therapeutics due to their least toxicity and high potency. Kajjali, Rasaprapti, Rasagarbha Potitali, Hemagarbha Potitali, Rasasindura, Makaradhwaja, etc., are the examples of this process. Rasa classics claims that, Parada (mercury) treated with Gandhaka (sulphur) becomes highly potentiated, that is, acquire many pharmacological and therapeutic properties. It is further believed in these contexts that the potentiation of Parada depends on the proportion of Gandhaka burnt in Jarana process. The textual references also support the above statement and according to this Shadguna Balijarita Parada is claimed to be much more powerful and effective than Samaguna or Dwiguna Balijarita Parada. In addition, many texts claim that without Shadguna Gandhaka Jarana, Parada does not acquire the power of curing diseases.

Preparations which are primed in Kachakupi with a specific heating pattern in Valuka Yantra are termed as Kupipakwa. Initially these were carried out in Sharana and Musha in context of Parada Bhasma. But in later period of Rasaprakash Sudhakana, that is, from 14th century onwards, it was modified with the use of Kachakupi (glass bottle). Kupipakwa Rasayana Kalpana is unique, due to its preparation method, properties like quick action, Rasayana (rejuvenator and revitalizer), Yogavahi (promoting) and effective in smaller dosage along with long shelf life. Hence, here with the help of three and six times

Address for correspondence: Dr. Shraddha N. Dhundi, Ph. D. Scholar, Department of RS and BK, I.P.G.T and R.A, Gujarat Ayurved University, Jamnagar - 361 008, Gujarat, India. E-mail: shraddha.dhundi@gmail.com
Materials and Methods

Collection of raw material
Ashuddha Gandhaka (raw sulfur), Ashuddha Parada (raw mercury) were initially procured from Pharmacy, Gujarat Ayurved University, Jamnagar and authenticated. Kumari (Aloe barbadensis Mill.) was collected from periphery of Jamnagar and fresh Panchanga (whole plant) and especially flowers of Rakta Karpasa (Gossypium arboreum Linn.) were collected from Bijapur, Karnataka and authenticated in the Pharmacognosy Laboratory, I.P.G.T. and R.A. Jamnagar.

Ashtasamskaras of Parada, Shodhana of Gandhaka, preparation of Rakta Karpasa Pushpa Swarasa (flower juice) and Kumari Swarasa (aloe juice) were carried out as per classical references. The products were analyzed for Inductive Coupled Plasma – Optical Emission Spectrometer (ICPOES) for their minor chemical constituents. The maker of instrument was CPA Ltd. Bulgaria (Model-Optima 3300 RL).

Preparation of Makaradhwaja
The whole process was carried out in four stages:

Preparation of Swarna Pishti
The measured quantity of Ashtasamskarita Parada was taken in Simaka Khalva Yantra (mortar-pestle) then Swarna Varkha (gold foils) [Figure 2] was added to it and trituration process was carried out till the formation of Swarna Pishti (amalgam) [Figure 3].

Preparation of Kajjali
Previously prepared Swarna Pishti was taken in Simaka Khalva Yantra then Shuddha Gandhaka [Figure 4] was added to it in prescribed quantity followed by trituration process till the formation of Kajjali. This process was carried out in eight batches for Triguna Kajjali (TK) and three batches in Shadguna Kajjali (SK)[Figure 5].

Bhavana
Respective Bhavanas (levigation) of Rakta Karpasa Pushpa Swarasa and Kumari Swarasa were given to both the Kajjali [Figure 6].

Kupipaka
The Bhvita Kajjali was filled in seven layers mud smeared cloth (Kapadamitti) Kacha Kupi for respective batches through funnel. Kupi were kept in EMF and Kramagni was given for 18 h to TK and 36 h to SK. After disappearance of the flame confirmative tests like red hot bottom, Sheeta Shalaka test, coin test were carried out and corking was done. Kupi were left for self cooling and on the next day the Kupi were taken out of EMF for collection of products, which were kept in air tight container [Figure 7].

Observations and Results
In preparation of TM by Shuddha Swarna Varkha (gold foils of processed gold), Ashtasamskarita Parada (Parada after eight specific processes – in which initial five are purificatory and last three are potentiating in nature).

Out of four batches, total 669.5 g of Swarna Pishti was procured. The total 669.5 g of Pishti and 1800g of Shudha Gandhaka was added and trituration was carried out to procure 2425.8 g of TK 39 g loss in weight of Kajjali was observed. The TK was further processed for sequential Bhavanas of Rakta Karpasa Pushpa Swarasa (fresh juice of flowers of Gossypium arboreum Linn.) and Kumari Swarasa [Table 1]. Overall 62 g of weight gain of Kajjali, that is, 2.70% was observed after Bhavana process.

For the preparation of Kajjali of Shadguna [Table 2], 833.1 g

![Figure 1: Ashtasamskarita Parada](image1)

![Figure 2: Swarna Varkha](image2)

![Figure 3: Swarna Pishti](image3)

![Figure 4: Shuddha Gandhaka](image4)

![Figure 5: Preparation of Kajjali](image5)

![Figure 6: Levigation of Makaradhwaja Kajjali](image6)
of TK and 600 g Gandhaka (i.e., three times Gandhaka to the weight of Parada) was added and trituration was done. After SK Nirmana, the prescribed Bhavana of Raktu Karpasa Pushpa Swarasa and Kumari Swarasa were given. Finally 1420.1 g of SK with 13 g of weight loss, that is, 0.93% was procured.

TM is prepared in five subsequent batches of 330 g of TK with 18 h of Kramagni Paka (increasing heating system). Similarly SM is prepared in five subsequent batches of 250 g of SK with 36 h of Kramagni Paka.

The pharmaceutical preparation of TM [Table 3] and that of SM [Table 4], the flame lasted averagely in TM for 3.01 h and in SM for 4.58 h [Chart 1, Figure 8]. Average TM obtained was 29.12 g, percentage of TM was 8.83 g, [Figures 9, 10] whereas average SM obtained was 16.8 g, [Figures 10-12] percentage of SM was 6.59% [Charts 2, 3].

Organoleptic analysis showed that both products were tasteless, the color of TM as reddish brown and of SM as reddish chocolate brown after vigorous trituration, both were odorless, and in touch outer surface was smooth and inner side was rough crystalline.

The physicochemical analysis of two of the Kajjalis and both

| Table 1: Brief observational profile of consequent Bhavana of Triguna Makaradhwaja Kajjali |
|-----------------------------------------------|
| Wt of Kajjali after Mardana (g) | Rakta Karpasa Pushpa Swarasa ml | Total Mardana period (h) | Kumari Swarasa (ml) | Total Mardana period (h) | Wt of Kajjali after Bhavana | Wt increased due to Bhavana |
|-----------------------------------------------|
| 2425.8 | 668 | 48 | 920 | 48 | 2487.8 | 62 | 2.70 |

| Table 2: Observations during preparation of Shadguna Kajjali with Bhavanas |
|-----------------------------------------------|
| Wt of Triguna Kajjali | Wt of Shu. Gandhaka (g) | Rakta Karpasa Pushpa Swarasa (ml) | Total Mardana period (h) | Kumari Swarasa (ml) | Total Mardana period (h) | Total (g) % Nischandratva Rekhapurnatva of Kajjali (h) | Total Mardana period (h) | Wt of Kajjali after Mardana (g) | Wt loss during Mardana (g) % |
|-----------------------------------------------|
| 833.1 | 600 | 148 | 18 | 320 | 18 | 1433.1 | 176 | 194 | 1420.1 | 13 | 0.93 |

| Table 3: Mean observations during Kupipaka of Triguna Makaradhwaja (Batch I-V) |
|-----------------------------------------------|
| Time (h) | Temp set (°C) | Temp observed (°C) | Observations |
|-----------------------------------------------|
| 0.00 | 150 | 39 | Kupi Kept, EMF Started, Typical Smell of Makaradhwaja Kajjali can be smelt, Slight fumes started within 15 min |
| 0.45 | 150 | 158 | White fumes can be recognized |
| 6.30 | 350 | 335 | Dense yellow fumes, neck wet |
| 10.15 | 425 | 422 | Semi molten Kajjali at the bottom |
| 12.15 | 450 | 452 | Flame appeared 1 inch out of neck |
| 13.15 | 455 | 457 | Flame persists with fumes–4 inches |
| 13.45 | 465 | 458 | Very dense fumes with flame burning with blue color–5 inches |
| 14.30 | 480 | 484 | Flame in neck |
| 15.00 | 490 | 494 | Sheeta Shalaka test +ve, coin test +ve, Bottom can be seen red hot |
| 15.15 | 500 | 501 | Flame went off |
| 15.30 | 525 | 519 | Loose corking done, |
| 15.45 | 525 | 521 | Sublimation started |
| 16.00 | 550 | 548 | Corking |
| 18.00 | Stopped | 603 | Stopped, left for self cooling |

| Table 4: Mean observations during Kupipaka of Shadguna Makaradhwaja (Batch I-V) |
|-----------------------------------------------|
| Time (h) | Temp set (°C) | Temp observed (°C) | Observations |
|-----------------------------------------------|
| 0.00 | 150 | 34 | Kupi started, typical smell of Makaradhwaja Kajjali |
| 1.00 | 150 | 148 | White fumes can be visualized |
| 4.30 | 200 | 200 | Slight yellow fumes |
| 14.30 | 275 | 271 | Semi molten Kajjali at bottom |
| 20.30 | 350 | 346 | Dense yellow fumes |
| 26.30 | 450 | 452 | Dense yellow fumes with total wet neck |
| 27.30 | 475 | 465 | Flame appeared, 2 inch in length |
| 28.30 | 500 | 498 | 5 inches in length, then reduced slowly |
| 29.30 | 525 | 521 | Vigorous Shalaka Sanchalana, flame in neck, gradually decreased, Sheeta Shalaka positive, coin test positive |
| 30.30 | 550 | 548 | Flame went off, loose corking done |
| 31.30 | 550 | 552 | Corking done, sublimation started |
| 36.00 | Stopped | 603 | Furnace stopped, kept for self cooling |

EMF: Electrical muffle furnace
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finished products revealed that, moisture content\(^{[18]}\) of TK and SK were 0.35 and 0.008, whereas that of TM and SM was same as 0.0009 for both. Ash values\(^{[19]}\) of previous four entities were 26.38, 26.43, 0.4, and 0.35, respectively [Table 5].

The ICPOES study sample of TM confirmed the presence of 7.2976 ppm (particle per million) of gold, whereas the amount of gold achieved in SM was 663.14 ppm, which was remarkably many folds higher than TM [Table 6].

Discussion

The Siddhabheshajamanimala appreciated seven qualities of Makradhwaja (Chandrodaya Rasa\(^{[20]}\)) as it should have gold as a constituent, it should be enlightened or shining in night, it should show color of rising sun, which is settled in the bottom of Kupi, which is very pleasant, soft and should possess all the qualities for which it is appreciated.

The change in color of Triguna to SM can be justified by the reason that the amount of Gandhaka used and time taken for preparation of SM than TM was exactly double and it might also be due to the formation of polysulfide compound, which is relevant with procurement of darker product.

In comparing the ash value of both Kajjalis of TM and SM with the finished product. The value decreased from 26.38 to 0.4 in TM and from 26.43 to 0.35 [Table 5] in SM, which shows existence of comparatively loose bonds in Kajjali and compact bonds in TM and SM.

ICPOES is an instrument useful for measuring higher
concentrations of individual ingredients as far as herbo-mineral or metalo-mineral compound formulations are concerned. Apart from presence of gold, lead, copper, and iron were also detected in ppm levels in both the samples, namely, TM and SM. Quantity of gold present in TM (7.2976 ppm) was far below the levels reported[21] (268 ppm), although it is nearly equal to the levels reported initially (7.65 ppm). It is to be noted that in first case[21] TM had been prepared by Hinguloththa Patada, whereas in other works[19] done it was prepared from Ashtasamskarita Patada and Dwiguna Balijarana from Patra of Swarna. In the present work, Makaradhwaja was prepared by Ashtasamskarita Patada and subsequently Triguna and Shadguna Balijarana were carried out with Swarna Varkha.

Majority of the works had done initially signify the presence of gold in the sublimated product. Recent work carried out in 2009 had concluded that if Makaradhwaja is prepared by least particle size of elemental gold, gold content increases in the finished product.[21]

Copper was present in both the samples, 4.2019 ppm in TM and 13.154 ppm in SM. This is due to incorporation of Tarma during Urdhwaapatana Samskara of Parada. In addition, presence of iron was also seen [Table 5]. It may be due to the utilization of Ushna Shalaka during the later stages of Kupi Paka. Moreover, for Tiryaka Patana Samskara, iron instruments were used. Trituration of Kajjali in iron mortar and pestle may also be the possible reasons. Previously the presence of trace elements in Rasasindura to the roots of Ficus benghalensis[22] had been accredited, in Swaras of which it was triturated. This may also be possible in this case too. Karpasa Pushpa Swarasa (media for levigation) may have iron contents in it. Lead was also present in traces in both the samples (TM – 0.8951 ppm and SM – 51.576 ppm). Cross contamination from adjacent formulations or possibly leaded water used for Prakshalana (washing) during processing may also be a cause of contamination.

Further, in the present work, SM showed presence of 663.14 ppm of gold in the sublimated product. By far the research works concerned on Makaradhwaja; this is the highest percentage of gold reported till date. This further supports the conclusion of prior researcher[21] as Swarna Varkha was used in the preparation. Duration of trituration of Swarna Pshhti, duration of Paka (Madhyamagni and Tiragni, at the time of sublimation) and to a certain extent, errors in sample preparation may be the reasons for low quantity of gold reported in TM. Proper trituration of the amalgamated mass ensures proper interaction of gold with Parada.[23] As per Parada Vajnayam, Makaradhwaja prepared over longer duration of Paka are postulated to have more gold content,[24] which was supported by ppm values of gold in present study SM as it was prepared in 36 h in comparison to TM, which was prepared in 18 h. Improper sublimation of the final product may also be one of the reasons.

**Conclusion**

The duration of heat and amount of sulfur are directly proportional to therapeutic efficacy. At the same time the amount of gold to be sublimated with the product in ppm level is unservingly proportional to the Balijarana, which may help to increase the remedial value.

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हिंदी सारांश

त्रिगुण एवं शद्गुण मकरद्वज का निर्माण

श्रद्धा एवं धूलती, विस्वास्योति पटगिरि, प्रदीप कुमार प्रजापति, विनय जे. शुक्ला, बी. रविशंकर

कुमिपक्ष पद्धति द्वारा निर्मित मकरद्वज एक रसायन द्रव्य है। अहसंस्कार एवं बलिजारणा से निर्मित मकरद्वज क्षेत्र होता है। अतः प्रसुतु अध्ययन में मकरद्वज का निर्माण त्रिगुण एवं शद्गुण बलिजारणा के द्वारा किया गया। त्रिगुण एवं शद्गुण मकरद्वज का निर्माण पांडव वर्गों में किया गया। 330 ग्रा. त्रिगुण कक्षी से 29.92 ग्रा. त्रिगुण मकरद्वज एवं 250 ग्रा. शद्गुण कक्षी से 96.8 ग्रा. शद्गुण मकरद्वज की प्राप्ति हुई। कोणतांत्र ज्ञाता के लिए त्रिगुण मकरद्वज में 3.01 संदे एवं शद्गुण मकरद्वज में 4.48 संदे लगे। अतः प्रभुदुर्त तकनीकि विकल्पणों से निर्मित मकरद्वज में स्वर्ण का मूल्यांकन करने पर त्रिगुण में 7.21% पी.पी.एम. और शद्गुण में 6.63% पी.पी.एम. स्वर्ण प्राप्त हुआ।