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Standard Manufacturing Procedure of *Rajavarta Bhasma* Prepared from Two Varieties

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Abstract

Rasaaushadhi are the backbone of Ayurveda therapeutics. Bhasma Kalpana comprises of conversion of metals and minerals into suitable form. In Rasashastra, Rajavarta (lapis lazuli) is one among Uparatna (semiprecious stone) and used as a Bhasma in Prameha (polyuria), Kshaya (emaciation), Pandu (pallor) and many more. However besides its therapeutic uses, it remains unexplored by scholars of Rasashastra. In the present era, two types of Rajavarta are available in market based on its source that is, Afghan and Russian. No work has been done to standardize Rajavarta Bhasma prepared from both the varieties. The present study was undertaken to establish standard manufacturing procedure of Rajavarta Bhasma prepared from two different varieties. Three batches of Afghan and Russian Rajavarta Bhasma were prepared by Shodhana (purification) of both the varieties of Rajavarta followed by Marana (calcination) as per the reference of Rasatarangini to develop standard parameters. An average required Shuddha Gandhaka was 913 g and 897.6 g and Nimbu Swarasa was 3341.6 ml and 3352.6 ml for levigation in each batch of Afghan and Russian variety, respectively. The temperature pattern was recorded at regular interval of 15 min for 8.30 h, an average peak temperature was observed at 949.8°C – 963.7°C in Afghan and Russian variety, respectively. An average yield was found to be 76.67% and 76.34% for Afghan and Russian variety, respectively. The preparation of Rajavarta Bhasma in accordance with the procedure described in the classical literature has been ensured and standardized by the present study.

Keywords: Afghan *Rajavarta*, Russian *Rajavarta*, *Shodhana*, *Marana*, standard manufacturing procedure

INTRODUCTION

Ayurvedic medicines are prepared from plants, animals, metals and minerals origin. *Rasashastra* is an integral part of *Ayurveda*, that deals with the drugs of metal and mineral origin and details about their varieties, characteristics, processing techniques, properties, therapeutic uses and many more in a comprehensive way. Metals and minerals as such in elemental form cannot be used for therapeutic purpose since many of them are toxic to human body. But *Rasashastra* involves pharmaceutical processes [*Shodhana* (purification), *Marana* (calcination)] that helps to harness the therapeutic potential of herbs, metals and minerals and convert them to bio-assimilable form.

The demand of *Ayurvedic* formulations have been raised globally in the present era, resulting in commercialization of *Ayurvedic* drug manufacturing. Therefore certain things such as standardization, quality control and safety became

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essential requirements for acceptance of the final product. *Ayurvedic* pharmaceutical industries follow certain standards to ensure the quality, safety and efficacy of drug that comes under Good Manufacturing Practices (GMPs). It deals with raw material standardization, process standardization and finished product standardization. There are many methods for *Shodhana* and *Marana* of a single drug. Hence it is important to lead down some specific methods for better accuracy, efficiency and batch-to-batch consistency in the final product.

Rajavarta (Lapis lazuli) is one among *Uparatna* (semiprecious stone) which is mentioned from 7th century text to contemporary text. Detailed description regarding its types, synonyms, *Grahya Lakshana*, *Guna-Karma* [1], *Shodhana*, *Marana*, therapeutic indications, and formulations [2] have been found in the classical text of *Rasashastra*. It is widely used in *Bhasma* form having *Deepana* (digestion and metabolism enhancing) and *Pachana* properties. Henceforth, it is useful in disorders such as *Pandu* (pallor), *Prameha* (polyuria), *Kshaya* (emaciation), and *Hikka* (hiccup); it also nourishes and rejuvenates the body [3]. Currently two varieties are available in the market on the basis of its geographical sources that is, Afghan and Russian. Although its therapeutic use is restricted due to lack of standardization parameters, only one research work has been conducted on *Rajavarta Bhasma* in which scholar has done characterization and preparation of *Rajavarta Bhasma* irrespective of its variety [4]. So that the present study was aimed to fix certain standard parameters for preparation of *Rajavarta Bhasma* prepared from two varieties which helps to ensure the quality of *Bhasma*.

MATERIALS AND METHODS

Rajavarta was procured from authorized gem traders in Khambhata, Gujarat, India. After procurement, *Rajavarta* was given for authentication at "Neel Gem's Testing Laboratory" [ISO (9001-2008) certified] Ahmedabad, Gujarat, India. The laboratory had authentified and certified the sample as Afghan and Russian variety of *Rajavarta*. *Gandhaka* (sulphur) was collected from the Government Ayurvedic Pharmacy, Vadodara, Gujarat, India. Fresh *Yava Panchanga* was collected from the farmers of Gujarat, India. *Nimbu*, *Goghrita* and *Godugdha* were procured from the local market of Vadodara, Gujarat, India. *Gomutra* was collected from nearby cow abode in Vadodara, Gujarat, India. All the herbal materials were identified and authenticated in the Pharmacognostic laboratory of Upgraded Department of Dravyaguna of Government Ayurveda College, Vadodara, India. A brief description of the materials used during the preparation of *Rajavarta Bhasma* is given in Table 1.

Process Validation of *Yavakshara* Preparation

About 45 kg of fresh *Yava Panchanga* was collected and dried under sunlight. 26.5 kg of dried material was obtained which was further burnt in iron pan and allowed for self-cooling. Then greyish white colored ash was collected, weighed and stored in air tight container. A total of 80.38% of yield was obtained from the dried plant. After that *Yavakshara* was prepared in five batches by taking ratio of ash and water volumetrically as per the reference of Rasatarangini. Average yield percentage of obtained *Yavakshara* was 14.53%.

Process Validation of *Rajavarta Shodhana*

Shodhana of *Rajavarta* was conducted as per the reference of Rasatarangini [5]. For *Shodhana* process, liquid media was prepared by mixing *Gomutra* (1 part), *Nimbuka Swarasa* (1/8th part) and *Yavakshara* (1/20th part) as per the reference of Anandkanda [6]. *Ashuddha* Afghan *Rajavarta* (100 g × three batches for each variety) was taken and boiled in liquid media prepared by mixing *Gomutra* (600 ml × three batches), *Nimbuka Swarasa* (75 ml × three batches), and *Yava Kshara* (30 g × three batches).

Table 1. Brief description of drugs used in preparation of *Rajavarta Bhasma*.

S. No.	Name of drug	Latin name / English name	Proportion	Purpose
1	*Gomutra*	Cow urine	1 part	*Shodhana*
2	*Nimbu Swarasa*	Fruit juice of *Citrus limon* (Linn.) Burm. F.	1/8th part	*Shodhana* and *Marana*
3	*Yava Kshara*	Alkali of *Hordeum vulgare*	1/20th part	*Shodhana*
4	*Gandhaka*	Sulphur	1 part	*Marana*

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After completion of *Swedana*, *Pottali* was removed and the material was washed with lukewarm water. *Shuddha Rajavarta* was dried under sunlight. Then it was weighed and stored in air tight container.

Process Validation of *Gandhaka Shodhana*

Shodhana of *Gandhaka* was conducted as per the reference of Rasatarangini [6]. *Ashuddha Gandhaka*: 1 kg × seven batches = 7 kg, *Godugdha* (cow milk): 2 L × three times × seven batches = 42 L (gravimetrically double to the *Gandhaka* each time), *Goghrita* (cow ghee): 100 g × three times × seven batches = 2100 g were taken. *Gandhaka* was heated with *Goghrita* over *Mandagni* (mild heating). After melting, it was poured into *Godugdha* through *Goghrita* smeared cotton cloth. A solid mass with some granular form of *Gandhaka* was taken out and washed with hot water. This procedure was repeated for two times. After drying, *Shuddha Gandhaka* was weighed, powdered and kept in airtight glass container.

Process Validation of *Rajavarta Bhasma*

Rajavarta Bhasma was prepared as per the reference of Rasatarangini [7]. Equal quantity of *Shuddha Rajavarta* and *Gandhaka* was taken in stone mortar and *Bhavana* of *Nimbuka Swarasa* was given for 36 h. After that, uniform size *Chakrika* were made and kept for drying. After complete drying, *Sharavashamputa* was prepared and *Gajaputa* was given. On next day it was removed from *Gajaputa* and material was collected and triturated. This procedure was repeated nine times. After completion of 10th *Puta*, *Chakarika* were weighed and subjected to trituration in a stone mortar to get fine powder of it. Fine powder of *Bhasma* was sieved through 200#, weighed and stored in an airtight container.

OBSERVATIONS AND RESULTS

During the preparation of *Yavakshra*, temperature of flame and liquid media was noted at regular interval of 30 min along with reduction in water level. It was observed that gradually as liquid boiled, typical crackling sound has been heard and it gradually turned into semisolid-like consistency and started to stick in the vessel. At the end stage, white-colored *Kshara* was obtained. Temperature of liquid media was maintained between 90 °C to 100 °C. Details of results of *Yavakshara* preparation is depicted in Table 2.

During the procedure of *Rajavarta Shodhana*, temperature of flame and liquid media was recorded at an interval of 15 min. About 25 ml of liquid media was added at that time to maintained level of liquid media throughout *Swedana* procedure. During heating procedure, characteristic smell of *Nimbu Swarasa* and *Gomutra* was felt along with bubbling observed on the surface of vessel. Gradually color of liquid media turned into dark brown from yellowish brown. Luster and color of *Rajavarta* became dull and brittleness was increased after *Shodhana* procedure. Details of result of Afghan and Russian *Rajavarta Shodhana* is depicted in Tables 3 and 4.

Table 2. Results obtained during preparation of *Yavakshara*.

Parameters		B-1	B-2	B-3	Average
Total quantity of *Ksharajala*	In ml	6890	6875	6900	6888.3
	In g	6764	6768	6765	6765.6
Time taken for evaporation of *Ksharajala* (h:min)		06:10	06:15	06:20	06:15
Kshara obtained	In ml	148	145	143	145.3
	In g	121.5	120	118	119.8
% of *Kshara* obtained	v/v	14.8	14.5	14.3	14.53
	w/w	14.96	14.77	14.53	14.75
Total loss	In ml	852	855	857	854.6
	In g	690.5	692	694	692.16
% of loss	v/v	85.2	85.5	85.7	85.46
	w/w	85.04	85.23	85.47	85.24
Reason of loss	Due to evaporation of *Ksharajala*				

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Table 3. Details of result of Afghan *Rajavarta Shodhana*.

S. No.	Parameters	B-1	B-2	B-3	B-4	Average
1	Total days taken for *Rajavarta Shodhana*	02	02	02	02	02
2	Initial weight of *Ashuddha Rajavarta* (g)	100	100	100	100	100
3	Total quantity of liquid media required for *Shodhana* (ml)	600	600	600	600	600
4	Weight of *Rajavarta* before washing (g)	105	104	106	105	105
5	Weight of *Rajavarta* after washing (g)	102	101	102	102	101.75
6	Final weight of *Shuddha Rajavarta* (g)	100	100	100	100	100
7	Final weight of *Shuddha Rajavarta* (%)	100	100	100	100	100
8	Total gain/loss (g)	-	-	-	-	-
9	Total gain/loss (%)	-	-	-	-	-
10	Reason of gain/loss		-			

Table 4. Details of result of RRS.

S. No.	Parameters	B-1	B-2	B-3	Average
1	Total days taken for *Rajavarta Shodhana*	02	02	02	02
2	Initial weight of *Ashuddha Rajavarta* (g)	100	100	100	100
3	Total quantity of liquid media required for *Shodhana* (ml)	600	600	600	600
4	Weight of *Rajavarta* before washing (g)	105	106	104	105
5	Weight of *Rajavarta* after washing (g)	102	103	102	102.33
6	Final weight of *Shuddha Rajavarta* (g)	100	100	100	100
7	Final weight of *Shuddha Rajavarta* (%)	100	100	100	100
8	Total gain/loss (g)	-	-	-	-
9	Total gain/loss (%)	-	-	-	-
10	Reason of gain/loss	-			

Table 5. Details of result of *Gandhaka Shodhana*.

S. No.	Parameters	B-1	B-2	B-3	Average
1	Total days taken for *Gandhaka Shodhana*	02	02	02	02
2	Initial quantity of *Ashuddha Gandhaka* (g)	1000	1000	1000	1000
3	Total quantity of *Goghrita* required for *Gandhaka Shodhana* (g)	100	100	100	100
4	Total quantity of *Godugdha* required for *Gandhaka Shodhana* (ml)	6000	6000	6000	6000
5	Remaining quantity of *Godugdha* after *Gandhaka Shodhana* (ml)	5730	5710	5730	5723.33
6	Final weight of *Shuddha Gandhaka* after *Shodhana* (g)	980	975	980	978.33
7	Final weight of *Shuddha Gandhaka* after *Shodhana* (%)	98	97.5	98	97.83
8	Total loss (g)	20	25	20	21.66
9	Total loss (%)	2	2.5	2	2.16
10	Reason of loss	Sticking with cloth and vessel			

Russian *Rajavarta Shodhana*

During the procedure of *Gandhaka Shodhana*, it was melted in 9–10 min during first *Dhalana* and in subsequent *Dhalana* it took 15–16 min for melting. At the time of melting of *Gandhaka*, temperature recorded was 115 ℃–120 ℃. After completion of *Shodhana*, *Gandhka* was turned into dull yellow granular form from dark yellow crystalline form. Details of result of *Gandhaka Shodhana* is depicted in Table 5.

During *Bhasma* preparation, foaming was observed when *Nimbuka Swarasa* was added into the mixture. Characteristic smell of *Nimbuka Swarasa* and *Gandhaka* was felt throughout the levigation and also characteristic smell of *Gandhaka* was felt during incineration procedure. After each *Puta*, material became stickier up to 6th *Puta*. *Chakrika* attain brittleness after the very first *Puta* in each batch

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but colour of *Bhasma* was achieved gradually after completion of 5th *Puta* in both the varieties. Particulars of *Marana* procedure, duration of temperature given to *Puta*, specific observations and other parameters regarding weight of *Chakrika* along with quantity of liquid media used for each *Puta* etc., are depicted in Tables 6–13.

Table 6. Parameters of ARB (B-1).

No. of *Puta*	Quantity of material (g)	Quantity of liquid media (ml)	Weight of *Chakrika* (g)			Loss (g)
			Before *Puta*		After *Puta*	
			Wet	Dry		
1	200	350	248	201	100	100
2	200	345	245	202	100	100
3	200	340	245	201	100	100
4	200	335	246	200	99	101
5	198	335	240	200	98	100
6	196	330	238	197	95	101
7	190	325	230	192	92	98
8	184	325	225	185	86	98
9	172	325	218	173	82	90
10	164	325	215	165	79	85

Table 7. Parameters of ARB (B-2).

No. of *Puta*	Quantity of material (g)	Quantity of liquid media (ml)	Weight of *Chakrika* (g)			Loss (g)
			Before *Puta*		After *Puta*	
			Wet	Dry		
1	200	345	258	201	100	100
2	200	350	255	200	100	100
3	200	340	253	202	98	102
4	196	340	250	197	95	101
5	190	335	245	191	94	96
6	188	335	238	190	92	96
7	184	325	232	186	86	98
8	172	325	210	172	83	89
9	166	325	208	167	80	86
10	160	325	205	162	76	84

Table 8. Parameters of ARB (B-3).

No. of *Puta*	Quantity of material (g)	Quantity of liquid media (ml)	Weight of *Chakrika* (g)			Loss (g)
			Before *Puta*		After *Puta*	
			Wet	Dry		
1	200	345	260	201	100	100
2	200	350	258	202	100	100
3	200	340	258	201	98	102
4	196	340	252	197	98	98
5	196	335	250	198	95	101
6	190	335	245	192	92	98
7	184	325	242	185	85	99
8	170	325	235	173	82	88
9	164	325	228	167	79	85
10	158	325	225	160	75	83

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Table 9. Result of ARB.

S. No.	Parameters	B-1	B-2	B-3	Avg.
1	Total days for preparation of ARB	52	56	60	56
2	Initial quantity of *Shudhha Rajavarta* (g)	100	100	100	100
3	Total quantity of *Gandhaka* required for *Marana* (g)	931	904	904	913
4	Total quantity of *Nimbu Swarasa* required for *Bhavana* (ml)	3335	3345	3345	3341.6
5	Final weight of *Rajavarta Bhasma* (g)	79	76	75	76.66
6	Final weight of *Rajavarta Bhasma* (%)	79	76	75	76.66
7	Total loss (g)	21	24	25	23.33
8	Total loss (%)	21	24	25	23.33
9	Reason of loss	Due to incineration process			

ARB: Afghan Rajavarta Bhasma

Table 10. Parameters of RRB (B-1).

No. of *Puta*	Quantity of material (g)	Quantity of liquid media (ml)	Weight of *Chakrika* (g)			Loss (g)
			Before *Puta*		After *Puta*	
			Wet	Dry		
1	200	350	257	202	100	100
2	200	350	260	204	100	100
3	200	345	258	202	98	102
4	196	340	252	197	95	101
5	190	335	247	191	93	97
6	186	330	233	187	90	96
7	180	325	224	181	88	92
8	176	325	218	176	82	94
9	164	325	210	165	78	86
10	156	325	105	158	75	81

Table 11. Parameters of RRB (B-2).

No. of *Puta*	Quantity of material (g)	Quantity of liquid media (ml)	Weight of *Chakrika* (g)			Loss (g)
			Before *Puta*		After *Puta*	
			Wet	Dry		
1	200	350	258	202	100	100
2	200	345	260	201	100	100
3	200	345	258	201	97	103
4	194	340	245	196	95	99
5	190	340	235	192	92	98
6	184	335	232	185	86	98
7	172	325	228	175	82	90
8	164	325	212	165	78	86
9	156	325	208	158	76	80
10	152	325	202	154	76	76

DISCUSSION

Rajavarta (Lapis lazuli) is mineral origin stone of *Uparatna Varga*. Like other *Uparatna*, *Rajavarta* is unexplored having good therapeutic efficacy as mentioned in the classics. Classical texts have mentioned two different varieties of *Rajavarta*, but in the present era Afghan and Russian varieties are widely available on the basis of its geographical source and used in preparation of different formulations. Only one research work has been done on *Rajavarta* but any specification regarding

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variety of *Rajavarta* is not mentioned. So, the present study was aimed to develop standard manufacturing procedure (SMP) of ARB and RRB.

Table 12. Parameters of RRB (B-3).

No. of *Puta*	Quantity of material (g)	Quantity of liquid media (ml)	Weight of *Chakrika* (g)			Loss (g)
			Before *Puta*		After *Puta*	
			Wet	Dry		
1	200	350	262	201	100	100
2	200	350	258	202	100	100
3	200	345	258	202	98	102
4	196	340	252	198	97	99
5	194	335	248	195	95	99
6	190	330	238	192	92	98
7	184	325	230	185	87	97
8	174	325	225	177	84	90
9	168	325	217	170	80	88
10	160	325	215	162	78	82

Table 13. Result of RRB.

S. No.	Parameters	B-1	B-2	B-3	Avg.
1	Total days taken for preparation of RRB	55	57	57	56
2	Initial quantity of *Shudhha Rajavarta* (g)	100	100	100	100
3	Total quantity of *Gandhaka* required for *Marana* (g)	900	882	911	897.66
4	Total quantity of *Nimbu Swarasa* required for *Bhavana* (ml)	3350	3355	3350	3351.6
5	Final weight of *Rajavarta Bhasma* (g)	75	76	78	76.33
6	Final weight of *Rajavarta Bhasma* (%)	75	76	78	76.33
7	Total loss (g)	25	24	22	23.66
8	Total loss (%)	25	24	22	23.66
9	Reason of loss	Due to incineration process			

RRB: Russian Rajavarta Bhasma

Yavakshara is one of the ingredients of *Shodhana* media, so that firstly *Yavakshara* has been prepared as per the reference of Rasatarangini [8]. Two pilot batches were conducted—in the first batch, the ratio of *Yava* ash and water was taken gravimetrically and in the second batch the ratio was taken volumetrically to find out the yield percentage in both the methods. Yield percentage in 1st and 2nd pilot batch was 9% and 14.73%, respectively. On the basis of observations, five main batches were prepared by the following volumetric ratio. Average 14.53% (v/v) of *Yavakshara* has been obtained from 50 kg of fresh *Yava Panchanga*.

Shodhana is preliminary procedure which helps to remove physical impurities, improves the therapeutic efficacy and convert the material into suitable form to facilate further pharmaceutical procedures. In context of *Rajavarta* mainly *Swedana* procedure has been mentioned with different liquid media in different *Rasagrantha*. In *Swedana* procedure, constant heating with specific media was applied for specific time period. Brittleness was significantly changed after heat treatment [9]. So, may be due to that reason most of the texts have mentioned *Swedana* procedure as a *Shodhana* for *Rajavarta*. Here, *Shodhana* was conducted following the guidelines outlined in Rasatarangini [10]. But the ratio of liquid media preparation for *Shodhana* procedure is taken from text Anandakanda [11] as it is not mentioned in any classical text. Pilot batch of *Rajavarta Shodhana* was conducted for the following purposes:

- To set the ratio and quantity of liquid media required for *Shodhana*;
- To look for any changes taking place in *Rajavarta* after *Shodhana* including its yield percentage;

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- To draw the basic idea regarding addition of liquid media at specific time interval during *Sweadana* procedure for 3 h;
- For basic idea regarding temperature pattern of both flame and liquid media.

Each batch employed a total of 600 ml of liquid media, revealing no weight loss after *Shodhana*. On an average, 2400 ml of *Gomutra*, 300 ml of *Nimbu Swarasa*, and 120 g of *Yavakshara* were utilized for *Shodhana* across all the batches. A 100% yield was achieved after *Shodhana*; the color of *Rajavarta* became lighter and brittleness was increased after *Shodhana*. Here *Gomutra*, *Nimbu Swarasa*, and *Yavakshara* in combination mainly helps to bring physical changes in *Rajavarta* because *Gomutra* is well known catalyst agent [12] and *Nimbuka Swarasa* and *Kshara* has *Ksharana* properties (corrosive in nature).

Gandhaka has been used as a *Maraka Dravya* to prepare *Rajavarta Bhasma*. For that, *Gandhaka* was purified as per the reference of Rasatarangini [13]. It was done in one pilot batch and eight main batches. As per the pilot batch, all the seven main batches of *Gandhaka Shodhana* has been done. Total 7.5 kg of *Gandhaka* was purified for *Marana* of *Rajavarta*. Average 45 L of *Godugdha* and 750 g of *Goghrita* were used for 7.5 kg of *Gandhaka Shodhana*. Total 7.3 kg *Gandhaka* was obtained. Average 97.83% yield was obtained. It was observed that when *Gandhaka* was heated with *Goghrita* it turned into oily liquid form. Here fat-soluble impurities of *Gandhaka* may dissolve with *Goghrita*. Physical impurities which were not dissolved with *Goghrita* may remain on the surface of cloth while melted *Gandhaka* was poured through it. Again, when *Gandhaka* was poured in *Godugdha*, fat-soluble impurities along with globules of *Ghrita* floated on the surface of *Godugdha* and also aqueous soluble impurities may also dissolve in aqueous part of milk so that after *Shodhana*, amorphous and yellow colour of *Gandhaka* has been obtained.

Marana converts the material into suitable compound form that is free from undesired effects and bring fineness to the material. It evolves desired properties into the material. The references regarding method of preparation for *Rajavarta Bhasma* was collected through various texts and it was observed that Rasatarangini specifically noted the use of *Gajaputa* for *Marana*, while other texts did not specify the *Puta* type. *Gandhaka* is found as common ingredient for all *Uparatna Marana* and also for *Rajavarta*. *Uparatna* are mainly silicates [14]. It is also found that *Gandhaka* is used in glass industry [15] for breakdown of silica which helps to loosen the chemical bonding by oxidation procedure in presence of heat. So due to this reason, classics have advised *Gandhaka* as *Maraka Dravya* for not only *Rajavarta* but also for all *Uparatna*. A singular dissertation suggested *Varahaputa* for *Bhasma* but scholar did not specify the pit size and quantity of fuel. So that pilot batches using *Gajaputa* and *Varahaputa* were conducted, revealing that the *Gajaputa* is required for preparation of *Rajavarta Bhasma*. To develop SMP, three batches of each ARB and RRB were carried out. The average quantity of *Nimbuka Swarasa* used for levigation was 3351 ml for ARB and 3348 ml for RRB. Average quantity of *Gandhaka* used for ARB was 913 g and for RRB it was 897.66 g. Batch size of 100 g was taken for both the varieties and 76.67 g of ARB and 76.33 g of RRB *Bhasma* was obtained after 10 *Puta*. Average loss after completion of 10 *Puta* was 23.33% and 23.66% for ARB and RRB, respectively. It was observed that *Chakrika* was light pink and brittle in both the varieties after completion of 10 *Puta*.

Comparative Average Temperature Chart of *Rajavarta Bhasma*

The temperature of *Puta* during *Marana* of *Rajavarta* was recorded at regular intervals of 30 min for 9:00 h (Figures 1 and 2).

Comparative Temperature Chart of RRB

The average peak temperature was observed between 997.5°C and 990°C for ARB and RRB preparation, respectively. It was observed after average 02:00 h and remained static for 15 min.

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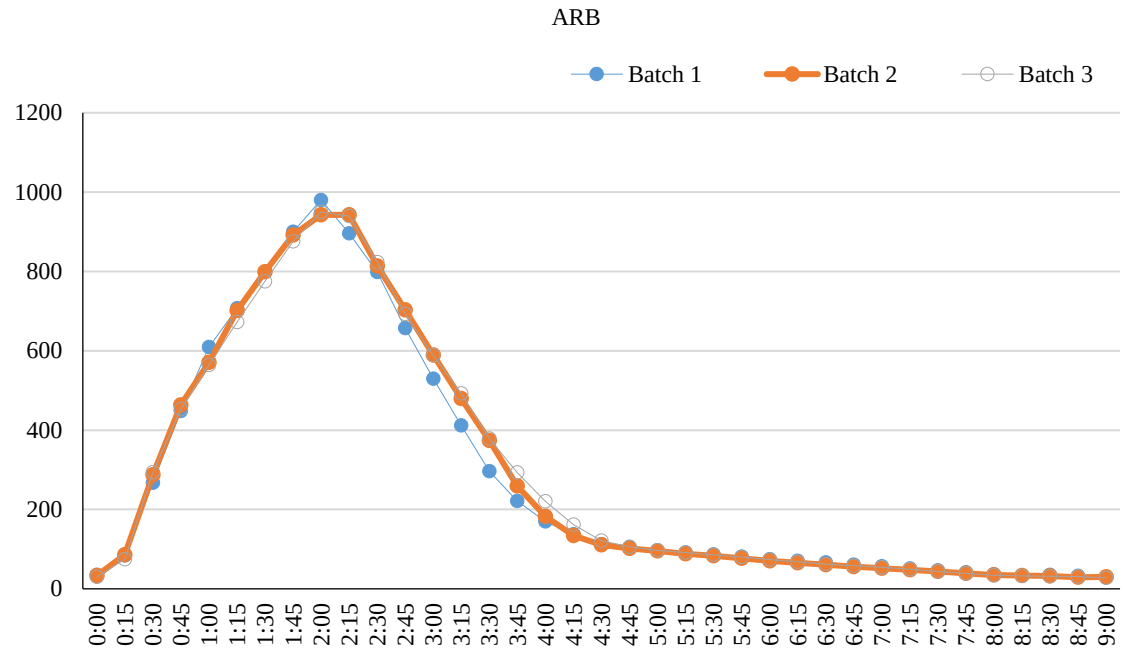

Figure 1. Average temperature chart of ARB.

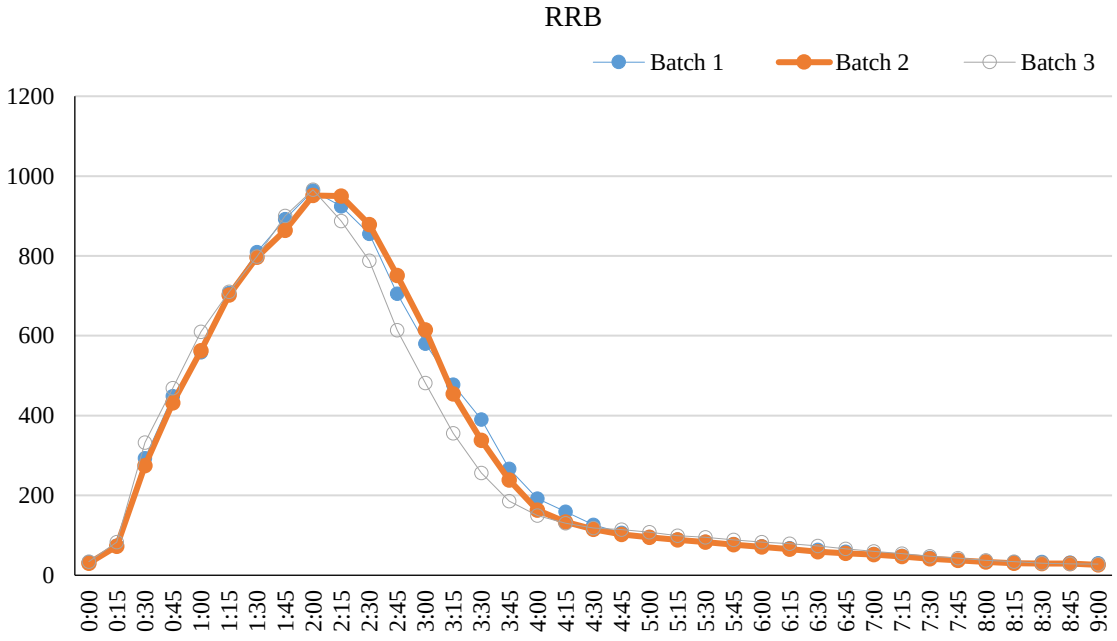

Figure 2. Average temperature chart of RRB.

CONCLUSION

The first step in standardizing any medicinal product is pharmaceutical standardization. The employed technique for preparation of *Rajavarta Bhasma* from both the varieties can be considered as SMP. The temperature pattern of *Gajaputa* applied in the present study to prepare *Bhasma* can be considered as a standard heating pattern. Findings suggested that there is no differences in pharmaceutical profile of *Rajavarta Bhasma* prepared by both the varieties. The existing observations and outcomes can serve as a foundation for forthcoming studies. The adopted method is applicable for future research endeavours involving larger batch sizes and can be considered as appropriate and convenient.

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