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Pharmaceutico analytical study of *Ashwagandha Ghrita*

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ABSTRACT

Ashwagandha (*Withania somnifera* (L) Family - Solanaceae) known as Indian ginseng is an effective immunomodulator, aphrodisiac, sedative and adaptogen. *Ashwagandha Ghrita* is a ghee based Ayurvedic formulation which is available in the market, but *Ashwagandha Ghrita* containing *Rasasindura* and *Tamra Bhasma* along with *Ashwagandha* and *Musta Churna* is also mentioned in classical text which many of us are not aware of. As we all know that the action of *Rasaushadhis* are quick and require very less dose the one mentioned by *Vagbhatacharya* (author of *Rasaratnasamuchaya*) is the need of the hour for the immunomodulation. The current trend in applied instrumental medical research encourages good medical practice, clinical and research based drug analysis. The main aim of analytical study is to find out working standards for the formulations and safe use of therapeutics.

Key words: *Ashwagandha Ghrita*, *Withania somnifera*, *Rasaushadhis*.

INTRODUCTION

Sneha Kalpana is the sum of words *Sneha* and *Kalpana*,^[1] where *Sneha* means fat or fatty material and *Kalpana* stands for pharmaceutical process of medicaments. *Sneha Dravyas* will have *Gunas* such as *Guru*, *Sita*, *Sara*, *Snigdha*, *Manda*, *Sukshma*, *Mridu*, *Drava Gunas*. Ayurveda mentions *Ghrita Kalpana* ad *Taila Kalpana* under *Sneha Kalpana*. *Sneha* is obtained from two *Yonis* i.e. *Sthavara* and *Jangama*. *Tila*, *Priyala*, *Abhisuka*, *Danti*, *Haritaki*, *Eranda*, *Madhuka*, *Sarshapa*, *Kusumbha*, *Bilwa*, *Aruka*, *Mulaka*, *Atasi*, *Nikocaka*, *Aksoda*, *Karanja* and *Shigru*, these are

Sthavara sources of *Sneha*.

As regards to *Jangama Yoni*, fish, quadruped animals and birds come under this group. *Ghrita*, *Taila*, *Vasa*, *Majja* are the best *Sneha Dravyas* of all. Amongst them *Ghrita*^[2] is the *Sneha Dravya* par excellence because of its power to assimilate effectively the properties of the substances. *Sneha Kalpana* can be defined as a pharmaceutical procedure which is followed to produce an oleaginous medicament from substances such as *Kalka* and *Drava Dravyas* (like *Kwatha*, *Swarasa*, *Ksheera*, *Dadhi*, *Takra* etc.). The *Kalpana* involves boiling or cooking them with drug, decoction or juice. *Ashwagandha Ghrita* is an important formulation mentioned in various textbooks like *Rasaratnasamuchaya*, *Bhaishajya Ratnavali*, *Bharatabhaishajya Ratnakara* in context of different diseases.

Ashwagandha Ghrita is easily available in the market. But, *Vagbhatacharya* in *Rasaratnasamuchaya*, has told a unique formulation of *Ashwagandha Ghrita* which contains *Ashwagandha Churna*, *Musta Churna*, *Rasasindura*, *Tamra Bhasma* and *Goksheera* which many of us are not aware of, and also it is not available in the market. Here he emphasizes that the

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Ghrita prepared in such a way will be having *Balya* actions which is nothing but immunomodulatory action. Among them *Ashwagandha*, *Goksheera*, *Ghrita* has *Rasayana* properties. *Rasasindura* is having *Yogavahi*, *Nadibalya*, *Rasayana* and *Vajeekarana* properties, increases the strength of *Snayu*. *Tamra Bhasma* is *Hrudya*, *Nadi Balya* and *Vishaghna*.

MATERIALS AND METHODS

PHARMACEUTICAL STUDY

1. Parada Shodhana

	Batch 1	Batch 2
Reference	Rasendra Sara Sangraha 283	Rasendra Sara Sangraha 283
Ingredients	Ashuddha Parada - 500g Haridra Churna - 500g Kumari Swarasa - 1.5L	Ashuddha Parada - 500g Haridra Churna - 500g Kumari Swarasa - 1.4L

Apparatus

Khalwa Yantra, Weighing Scale, Pots for Urdhwapatana, Cloth

Procedure

Firstly, by offering prayers to The Lord, *Kumari Swarasa* was taken in a *Khalwa Yantra* and to this *Haridra Churna* was added and triturated until a homogenous mixture was obtained. Later, *Ashuddha Parada* was added to it slowly and triturated. *Kumari Swarasa* was added whenever required. Total, 12 hrs of *Mardana* were carried out in both the batches.

Urdhwapatana of Parada

The *Kalka* was applied to the lower pot and closed with another pot and 7 layers of *Sandhibandhana* was given (each *Sandhibandhana* was given after drying of the previous *Bandhana*) and then subjected to *Urdhwapatana* for 6 Hours.

BATCH 1

Table 1: Temperature pattern of Urdhwapatana of Parada of Batch 1.

Time	Agni Temperature	Upper Pot Temperature	Lower Pot Temperature
10.10 AM	300° C	29° C	44° C

10.30 AM	350°C	53.5°C	156°C
11.00 AM	420°C	39°C	169°C
11.30 AM	450°C	33°C	143°C
12.10 PM	460°C	44.7°C	147°C
12.30 PM	465°C	51°C	434°C
12.55 PM	530°C	50°C	352°C
1.30 PM	550°C	48°C	286°C
1.45 PM	475°C	48°C	286°C
2.10 PM	500°C	48° C	307°C
2.45 PM	480°C	54°C	286°C
3.00 PM	486°C	50°C	433°C
3.35 PM	476°C	51°C	420°C
4.05 PM	491°C	46°C	423°C
4.10 PM	521°C	46°C	284°C

Total Yield - 311 g

Total Loss - 189 g

Time Duration - 6 Hours

BATCH 2

Table 2: Temperature pattern of Urdhwapatana of Parada of Batch 2.

Time	Agni Temperature	Upper Pot Temperature	Lower Pot Temperature
9.25 AM	126°C	26°C	49°C
9.55 AM	222°C	50°C	126°C
10.25 AM	226°C	49°C	156°C
11.00 AM	354°C	42°C	450° C
11.30 AM	353°C	43°C	304°C
12.10 PM	285°C	37°C	292°C
12.30 PM	305°C	48°C	298°C
1.30 PM	423°C	54°C	324°C

1.50 PM	400°C	38°C	334°C
2.40 PM	447°C	53°C	341°C
3.30 PM	428°C	54°C	351°C

Total Yield - 441 g

Total Loss - 59 g

Time Duration - 6 Hours

2. Gandhaka Shodhana

Reference: Rasa Tarangini

Ingredients (Each Batch)

Ashuddha Gandhaka - 500g

Go Dugdha - 1 Litre

Go Ghrita - Q.S. for application over cloth

Apparatus

Khalwa Yantra, Weighing Scale, Mud pot, Cloth, Sharava, Cow dungcakes

Procedure

- Ashuddha Gandhaka was taken in a Khalwa Yantra and powdered finely and weighed.
- A clean and dry mud pot was taken and its 3/4th was filled with Go Dugdha.
- The mouth of this pot was covered with a clean cloth and tied firmly.
- This cloth was smeared with ghee evenly and then the powdered Gandhaka was spread evenly and covered with a Sharava.
- Then Sandhi Bhandhana of the Sharava and the mouth of the pot was done and this was kept for drying.
- Then a small pit was dug in an open area and the pot was placed inside this pit which is deep upto the level of Sandhi Bandhana.
- Later, 8 Cow dung cakes along with few coconut shells were used to cover and then Agni was given.

- After Swanga Sheetata, the pot was taken out and opened carefully and Gandhaka was collected and washed with warm water for few times to remove the Ghrita and dried completely.

Temperature Pattern of Gandhaka Shodhana in Bhudhara Yantra - 1ST Batch

Time	Temperature (1 ST Batch)
11.25 AM	283°C
11.27 AM	443°C
11.33 AM	521°C
11.52 AM	191°C
12.15 PM	80°C

Total Yield - 502 g

Temperature pattern of Gandhaka Shodhana in Bhudhara Yantra - 2nd Batch

Time	Temperature (2 nd Batch)
12.23 PM	80°C
12.37 PM	244°C
12.42 PM	519°C
12.57 PM	380°C
1.10 PM	199°C

Total yield - 510 g

It was observed that after the highest temperature varying between 519-521°C, there was a gradual decrease in the temperature.

3. Preparation of Kajjali

Ingredients

Quantity of Ingredients	1 st Batch	2 nd Batch	3 rd Batch
Shuddha Parada	311 grams	220 grams	220 grams
Shuddha Gandhaka	311 grams	220 grams	220 grams

Yield

1st Batch - 618 g

2nd Batch - 437 g

3rd Batch - 436 g

Tabular representation of examination of *Kajjali*

Organoleptic characteristics	Observation of <i>Kajjali</i>
Appearance	Black colour
Touch	Smooth, fine, <i>Rekhapurna</i>
Smell	Smell of <i>Gandhaka</i>
Form	Fine powder

4. Preparation of *Rasasindura (Samaguna)*

Ingredients

Samaguna Kajjali - 250 grams (made out of *Parada* - 125 gram and *Gandhaka* - 125 gram)

Vatankura Swarasa - Q.S

Procedure

The entire process was divided in 3 phases as;

- *Purvakarma*
- *Pradhanakarma*
- *Paschatkarma*

1. *Purva Karma*

- All the essential ingredients and equipments were collected and kept ready for the preparation.
- *Kachakupi* was given a seven layered coating using cora cloth and multani mitti, where in each layer was done after complete drying of the previous layer.
- *Kajjali*, which was prepared was given *Bhavana* with *Vatankura Swarasa* for 3 times.
- After drying of the *Vatankura Bhavita Kajjali*, this was transferred to the *Kachakupi* carefully with the help of a funnel.

2. *Pradhana Karma*

- The *Kachakupi* with *Kajjali* was placed inside the vertical Muffle furnace in such a way that 1/3rd part of the neck of the *Kupi* was outside the

opening of the furnace and then the furnace was closed using an Iron lid which had a middle opening which can accommodate the neck of the *Kupi* upto its 1/3rd part.

- Then, the Muffle furnace was switched on and the starting temperature was set at 50 degree celsius and was gradually increased.
- The temperature was recorded at regular intervals.
- During the heating process, *Tapta Shalaka* was inserted into the mouth of the *Kupi* and the accumulated sulphur at the neck of the *Kupi* was burnt to prevent blockage.
- As the temperature increased, yellow fumes increased which later on came down.
- Later yellow flames started to appear followed by blue flames and the length of the flame increased which had gradually come down.
- After the blue flame disappeared, bottom of the *Kachakupi* became visible as the colour of Morning Sun (*Suryodaya Lakshana*).
- After observing *Suryodaya Lakshana*, a copper sheet was placed over the mouth of the *Kachakupi*.
- After the white particles was observed over the copper sheet, corking was done immediately to the *Kachakupi* and sealed.
- Later, *Teevragni* was given for 4 hours and then it was allowed for self cooling.

3. *Paschat Karma*

- After 36 hours of self cooling, *Kupi* was taken from the Muffle furnace.
- The *Sandhi Bandhana* layers was removed by scrapping with a knife and cleaned with a wet cloth and dried,
- A cotton string soaked in kerosine was tied 1 inch below the level of the compound and was set to fire with utmost care.

- After the string was completely burnt, the *Kupi* was wrapped with a wet cloth near the string and the *Kupi* was broken exactly at the area where the string was tied.
- The deposition at the level of neck region was carefully collected and weighed.

Tabular representation of observation during *Rasasindura Nirmana*

Time	Temperature	Observation
11.10 AM	29°C	<i>Kupisthapana</i>
12.10 PM	150°C	<i>Kajjali</i> is dry
12.30 PM	214°C	White fume appeared from the mouth of <i>Kupi</i>
12.40PM	250°C	Smell of <i>Gandhaka</i> was appreciated
1.00 PM	250°C	Appearance of yellow fumes, strong smell of <i>Gandhaka</i>
2.00PM	250°C	Yellow fumes
3.00 PM	275°C	Yellow fumes
4.00 PM	300°C	Yellow fumes
5.00PM	350°C	Yellow fumes
6.20 PM	375°C	Yellow fumes disappeared
7.00 PM	500°C	Appearance of blue flames
8.00 PM	500°C	Presence of Blue flames
9.00 PM	502°C	Presence of Blue flames
10.00 PM	503°C	Presence of Blue flames
11.00 PM	500°C	Presence of Blue flames
12.00 AM	510°C	Presence of Blue flames
1.00 AM	500°C	Reduction in the size of blue flame
2.00 AM	510°C	Absence of flame

2.15 AM	600°C	<i>Suryodaya Lakshana</i>
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Later, corking was done and *Paka* was given for 4 hours and then kept for *Swaangasheetata*.

Total Duration - 18 Hours

Total time taken for *Swaangasheetata* - 36 hours.

Total Yield - 139 grams from 238 grams of *Vatankura Bhavita Kajjali*

Preparation of *Tamra Bhasma*

The preparation involves the following procedures

- Shodhana* of *Tamra*.
- Marana* of *Tamra*.
- Amritikarana* of *Tamra*.

5. *Shodhana* of *Tamra*

Reference: *Rasaratnasamuchaya*

Ingredients

Ashuddha Tamra Patra - 365 g

Saindhava Lavana - Q.S

Nimbu Swarasa - Q.S

Media - *Sauviraka*

Apparatus Required

Iron Pan, Spatula, Cloth, Gas stove, Strainer, Iron mesh, Tongs, Gas stove etc.

Procedure

- Tamra Patras* was given *Lepana* with the *Lepa* prepared by mixing *Saindhava Lavana* and *Nimbu Swarasa*.
- The *Patras* were kept for drying.
- After complete drying of the *Patras*, an iron mesh was kept over the fire and the *Tamra Patra* was taken with the help of Tongs and heated until it became red hot.
- Temperature was noted during the entire process and the temperature at which the *Tamra Patra* became red hot was noted using Pyrometer.

- After the *Patras* became red hot, each *Patras* was quenched in the *Sauviraka* immediately placed in a vessel which had a strong base to avoid corrosion.
- After cooling, the *Tamra Patras* were taken out from the vessel carefully using the Tongs and was kept for drying.
- The same procedure including *Lepana* was repeated again for 7 more times.
- After 3rd *Nirvapa*, the *Patras* separated and was brittle. Hence further heating was carried out in an Iron kadahi.
- After each *Nirvapa* the weight of the *Patras* was noted.
- Time taken for the process was also noted here.

Observations

Initial Weight - 365 grams

Tamra Shodhana

Shodhana (By Nirvapa in Sauviraka)	Observations	Maximum Temperature and Time taken for attaining red hot state of Tamra	Weight of Tamra after Nirvapa
1	Greenish - orange flames Colour of <i>Patras</i> changed to coppery black from coppery brown <i>Patras</i> became brittle	545°C - 30 minutes	335 grams
2	Greenish flames Colour of <i>Patras</i> changed to brownish <i>Patras</i> became more brittle and some of them started breaking Took lesser time	539°C - 25 minutes	283 grams

	to get completely red hot Colour of media - Brown		
3	Colour of <i>Patras</i> - brownish black <i>Patras</i> started breaking into multiple pieces after <i>Nirvapa</i> <i>Sauviraka</i> has become greyish in colour after <i>Nirvapa</i>	532°C – 21 minutes	253 grams
4	The procedure has become easy as <i>Patras</i> were heated in <i>Kadahi</i> from 4 th <i>Nirvapa</i> as the <i>Patras</i> were in pieces. <i>Patras</i> started turning into coarse form after <i>Nirvapa</i> <i>Sauviraka</i> became blackish in colour and thick	521°C – 20 minutes	274 grams
5	<i>Tamra</i> took less time to become red hot <i>Tamra</i> has again splitted after nirvapa. Colour of media – Greyish black	519°C – 18 minutes	301 grams
6	<i>Tamra</i> took less time to become red hot <i>Tamra</i> has become thinner Colour of media – Black	521°C – 17 minutes	311 grams
7	<i>Tamra</i> took less time to become	502°C -15 minutes	308 grams

	red hot <i>Tamra</i> has become coarse powder Colour of media – Black		
8	<i>Tamra</i> took less time to become red hot <i>Tamra</i> has become more coarse powder Colour of media - Black	511°C - 13 minutes	310 grams

Total Yield - 310 grams

Total Loss - 55 grams

6. Marana of Tamra

Reference: Rasendrasarasamgraha

Ingredients

Shodhita Tamra - 100 grams

Samaguna Kajjali - 100 grams

Jambira Swarasa - Q.S

Procedure

- *Kajjali* was given *Bhavana* with *Jambira Swarasa*, this mixture was mixed with the *Shodhita Tamra* in a *Khalwa Yantra* and made into a form of *Chakrika* and kept for drying.
- After complete drying, this *Chakrikas* was transferred to a *Sharava* and covered placing another *Sharava* above this and *Sandhibandhana* was done.
- After complete drying of the *Sandhibandhana* and then subjected to *Gaja Puta* using Muffle Furnace.
- Temperature was noted every 15 minutes .
- The whole procedure was repeated until *Tamra Bhasma* was obtained.
- After each *Putra*, the weight of the *Tamra* was measured and then accordingly *Kajjali* and *Jambira Swarasa* were used.

- After completing the final *Putra*, the obtained *Bhasma* was subjected for *Amritikarana*.

Observations

Marana of Tamra

Putra	Temperature set and Time taken	Observations	Weight of Tamra after Putra
1	600°C - 50 minutes	After 40 minutes during the heating there was a smell similar to that of fried onions. The <i>Chakrikas</i> has become brownish black and powdery after the <i>Putra</i>	121 grams
2	700°C - 60 minutes	The <i>Chakrikas</i> has become light brick red in colour	100 grams
3	800°C - 88 minutes	At 281°C sharp smell of <i>Tamra</i> was observed. At 703°C smell of <i>Gandhaka</i> was appreciated The <i>Chakrikas</i> has become light brownish black in colour slightly charred and hard.	77 grams
4	700°C - 70 minutes	<i>Chakrikas</i> was brownish black in colour and quite hard	78 grams
5	700°C - 80 minutes	<i>Chakrikas</i> was brownish black in colour and its hardness reduced	70 grams
6	700°C - 75 minutes	<i>Chakrika</i> was dark brownish black in colour and soft and easily breakable	65 grams
7	700°C - 80 minutes	<i>Chakrikas</i> was brownish black in colour and hard.	63 grams
8	600°C - 62 minutes	<i>Chakrikas</i> was brownish black in colour and hardness reduced	74 grams
9	600°C - 75 minutes	<i>Chakrikas</i> was brownish black in colour and hardness	84 grams

		reduced	
10	600°C - 75 minutes	Chakrikas was brownish black in colour	89 grams
11	600°C - 70 minutes	Chakrikas was brownish and light black in colour	101 grams
12	600°C - 73 minutes	At 200°C strong smell of Tamra was appreciated. Chakrikas was brownish black in colour	103 grams
13	600°C - 67 minutes	Chakrikas was brownish black in colour	110 grams
14	600°C - 70 minutes	Chakrikas was brownish black in colour Rekhapurnatva - (+) Varitaratwa - (-)	136 grams
15	600°C - 68 minutes	Chakrikas was brownish black in colour and hard. Rekhapurnatva - (+) Varitaratwa - (-)	126 grams
16	500°C - 45 minutes	Chakrikas was brownish black in colour Rekhapurnatva - (++) Varitaratwa - (+) slight	136 grams
17	500°C - 55 minutes	Chakrikas was brownish black in colour Rekhapurnatva - (++) Varitaratwa - (+)	127 grams
18	500°C - 57 minutes	Chakrikas was brownish black in colour Rekhapurnatva - (++) Varitaratwa - (+)	128 grams

Weight of Tamra Bhasma (before Amritikarana) - 128 grams

7. Amritikarana of Tamra

Amritikarana includes the following procedures

1. Bhavana of Tamra Bhasma with Nimbu Swarasa

2. Sthapana of Nimbu Swarasa Bhavitha Tamra inside the Surana Kanda
3. Sandhibandhana of Surana
4. Giving Gajaputa of Surana containing Tamra.

Reference : Rasamritam

Ingredients

Tamra Bhasma - 128 grams

Nimbu Swarasa - Q.S

Surana Kanda - 1.95 Kg

Procedure

- Firstly, Tamra Bhasma is given Bhavana with Nimbu Swarasa and made into a bolus form and dried.
- A Surana was taken and a cone shaped pit was made inside the Surana and the left part of Surana was kept aside.
- To this pit, the bolus of Tamra was placed and then it was close by the Surana part which was kept aside.
- Then, Sandhi Bandhana was done for the Surana and kept for drying.
- After the Sandhibandhana was completely dried Gajaputa was given by keeping 700 Vanyopalas in the lower part and then Surana was placed above this. Then, 300 Vanyopalas was placed above the Surana and then Gajaputa was given.
- Temperature was noted every 15 minutes using a Pyrometer.
- After Swangasheetata Tamra was taken out from the Surana carefully.

Amritikarana of Tamra

Time	Temperature
12.11 PM	65°C
12.13 PM	139°C
12.18 PM	483°C

12.28 PM	1021°C
12.31 PM	939°C
12.43 PM	920°C
12.58 PM	1057°C
1.12 PM	814°C
1.28 PM	652°C
1.54 PM	297°C
2.24 PM	114°C
3.15 PM	54°C
4.21 PM	48°C

Total weight of *Tamra* - 105 grams

5. Preparation of Ashwagandha Ghrita (Herbal - AG 1)

Reference: Bhaishajya Ratnavali

Batch size - 1 Litre

Ingredients

Kalka Dravya - Ashwagandha Churna - 250 grams

Goghrita - 1 Litre

Ksheera - 10 Litres

Jala - 40 Litres

Procedure

- All the ingredients was kept aside.
- The *Kalka Dravya* (Ashwagandha Churna) was made into a bolus form using *Jala*.
- A Steel Kadahi was placed over the stove and heated, to this *Goghrita* was added and heated and allowed to melt.
- To this, *Ashwagandha Kalka* was added
- Later, when the *Kalka* became light brown in colour *Ksheera* was added and when the milk reduced to half *Jala* was added into it.

- Heating duration was adjusted from Mild to moderate with continuous stirring until *Sneha Siddhi Lakshana* was observed.
- The vessel was taken out from the fire and *Ghrita* was filtered through a clean cloth in its mild hot stage and later after cooling it was stored in an airtight container.

Total yield - 750 ml

6. Preparation of Ashwagandha Ghrita 2 (AG 2) (Rasasindura and Tamra Bhasma along with Kalka)

Reference: Rasaratnasamuchaya

Batch size - 1 Litre

Ingredients

Kalka Dravyas

- Ashwagandha Churna* - 31.25 grams
- Musta Churna* - 31.25 grams
- Rasasindura* - 31.25 grams
- Tamra Bhasma* - 31.25 grams

Goghrita - 1 Litre

Ksheera - 4 Litres

Jala - 16 Litres

Procedure

- All the ingredients was kept aside.
- The *Kalka Dravya* was made into a bolus form using *Jala*
- A Steel Kadahi was placed over the stove and heated, to this *Goghrita* was added and heated and allowed to melt.
- To this, the bolus of *Kalka Dravyas* was added
- Later, when the *Kalka* became moisture free and separated, *Ksheera* was added and when the milk reduced to half *Jala* was added into it.
- Heating duration was adjusted from mild to moderate with continuous stirring until *Snehasiddhi Lakshana* was observed.

- The vessel was taken out from the fire and *Ghrita* was filtered through a clean cloth in its mild hot stage and later after cooling it was stored in an airtight container.

Total yield - 900 ml

7. Preparation of Ashwagandha Ghrita 3 (AG 3)

(*Rasasindura* and *Tamra Bhasma* added just before *Paka*)

Reference: Rasaratnasamuchaya

Batch size - 1 Litre

Ingredients

Kalka Dravyas

- Ashwagandha Churna* - 31.25 grams
- Musta Churna* - 31.25 grams
- Rasasindura* - 31.25 grams
- Tamra Bhasma* - 31.25 grams

Goghrita - 1 Litre

Ksheera - 4 Litres

Jala - 16 Litres

Procedure

- All the ingredients was kept aside.
- The *Kalka dravya Ashwagandha Churna* and *Musta Churna* was made into a bolus form using *Jala*.
- A Steel Kadahi was placed over the stove and heated, to this *Goghrita* was added and heated and allowed to melt.
- To this, the bolus of *Kalka Dravyas (Ashwagandha and Musta)* was added.
- Later, when the *Kalka* became moisture free and separated, *Ksheera* was added and when the milk reduced to half *Jala* was added into it.
- Heating duration was adjusted from mild to moderate with continuous stirring.
- Tamra Bhasma* and *Rasasindura* was added just before the *Sneha Siddhi Lakshana*.

- Stirring was continued until *Snehasiddhi Lakshana* was attained.
- The vessel was taken out from the fire and *Ghrita* was filtered through a clean cloth in its mild hot stage and later after cooling it was stored in and airtight container.

Total yield - 700 ml

ANALYTICAL STUDY

1. *Bhasma Pareeksha*

Tabular Representation of *Bhasma Pareeksha*

<i>Bhasmas</i>	Colour	<i>Nischandratwam</i>	<i>Varitara</i>	<i>Rekha purna</i>	<i>Unama</i>	<i>Slaskshnatwa</i>
<i>Tamra Bhasma</i>	Black	+	+	+	+	+
<i>Rasasindura</i>	Brig ht Red dish Orange	+	+	+	+	+

2. Organoleptic Characters

Tabular Representation of Organoleptic Characters of *Rasasindura* and *Tamra Bhasma*

Organoleptic characters	<i>Tamra Bhasma</i>	<i>Rasasindura</i>
Colour	Black	Reddish orange
Odour	Metallic odour	Indistinct
Taste	<i>Avami, Niswadu</i>	Tasteless
Touch	Soft	Compact
Consistency	Powder	Soft

- Curd Test of *Tamra Bhasma* showed no specific colour change.

Tabular Representation of Organoleptic characters of Ashwagandha Ghrita 1, 2 and 3

Organoleptic characters	Ashwagandha Ghrita 1	Ashwagandha Ghrita 2	Ashwagandha Ghrita 3
Colour	Darker Yellow	Greenish Yellow with black coloured particles of <i>Kalka Dravya</i>	Yellow with minute black coloured particles of <i>Kalka Dravya</i>
Odour	Characteristic odour	Characteristic metallic odour	Characteristic mild metallic odour
Taste	Mild sweet taste of ghee	Mild bitter with metallic taste	Mild bitter with mild metallic taste
Touch	Smooth	Smooth	Smooth
Consistency	<i>Ghrita</i>	<i>Ghrita</i>	<i>Ghrita</i>

PHYSICO - CHEMICAL ANALYSIS

Tabular Representation of Physico -Chemical Analysis of Ashwagandha Ghrita 1, 2 & 3

Parameters	Ashwagandha Ghrita 1	Ashwagandha Ghrita 2	Ashwagandha Ghrita 3
Acid Value	1.16	1.11	1.05
Saponification Value	226.25	240.42	234.44
Iodine Value	32.30	29.61	31.44
Specific Gravity	0.908	0.902	0.908
Refractive Index	1.460	1.459	1.460
Loss on Drying	0.08%	0.27%	0.11%
Peroxide Value	Nil	Nil	Nil

3. Atomic Absorption Spectroscopy (AAS)

Tabular Representation of AAS of Ashwagandha Ghrita 1, 2 and 3

Heavy Metals	Ashwagandha Ghrita 1	Ashwagandha Ghrita 2	Ashwagandha Ghrita 3
Lead	< 1 ppm	< 1ppm	<1 ppm
Cadmium	< 0.1 ppm	< 0.1 ppm	< 0.1ppm
Arsenic	< 1 ppm	< 1ppm	< 1 ppm
Mercury	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm

4. Inductively Coupled Plasma Optical Emission Spectroscopy (ICP - OES)

A. Tamra Bhasma

Tabular Representation of ICP - OES of Tamra Bhasma

Parameter	Result
Copper	19000mg/Kg

B. Rasasindura

Tabular Representation of ICP - OES of Rasasindura

Parameter	Results
Mercury	3.81mg/Kg
Sulphur	1.44mg/Kg

C. Ashwagandha Ghrita 2

Tabular Representation of ICP - OES of Ashwagandha Ghrita 2

Parameter	Results
Mercury	4.92mg/Kg
Sulphur	0.56mg/Kg
Copper	7.50mg/Kg

D. Ashwagandha Ghrita 3

Tabular Representation of ICP – OES of Ashwagandha Ghrita 3

Parameter	Results
Mercury	0.61 mg/Kg
Sulphur	0.36mg/Kg
Copper	0.34mg/Kg

DISCUSSION

When *Parada* is triturated with *Haridra* and *Kumari*, it helps to make *Parada Nashtapishtha* and removes the *Maladosha* of *Parada* (RRS). Adopting *Urdhwapatana Samskara* helps to remove *Naga*, *Vanga Doshas*. In *Bhudhara* method loss is comparatively less.

Godugdha and *Goghrita* have *Madhura Rasa*, *Jeevaniya* property, helps in reducing the *Teekshnatwa*, removes *Visha Dosh*, fat soluble impurities and also removes arsenic with hydrocarbons of *Goghrita* and *Godugdha*.

The crystalline structure of *Gandhaka* transforms into amorphous form after the *Shodhana*.

The P_H of *Sauviraka* was 3.4 which means it is acidic and also *Nimbu Swarasa* is said to be acidic and *Saidhava Lavana* is alkaline which might be the reason behind the *Tamra Patras* getting brittle and remove the toxicity and later on reduction of the particle size.

The constituents present in *Surana* might help in removing the *Doshas* present in the *Tamra* and thereby making it more potent.

Probably, preparation of *Rasasindura* can be done using conventional methods for large scale production as it is much easier, requires very less manpower, faster, gives much better yield without affecting its quality.

Iodine value is more in *Ashwagandha Ghrita 1* when compared with AG2 and AG 3. The lesser value shows the degree of unsaturation. The more the iodine value, more unsaturated fatty acid bonds are present. More iodine value will make the *Ghrita* less stable,

softer and more susceptible for oxidation and rancidification. Hence AG 2 is more stable than AG 1 and AG 3.

The specific gravity of *Ashwagandha Ghrita 1* is 0.908, *Ashwagandha Ghrita 2* is 0.902 and *Ashwagandha Ghrita 3* is 0.908. The specific gravity is more in *Ashwagandha Ghrita 1* and 3 when compared with *Ashwagandha Ghrita 2* as the physical constituent or any solutes increases the specific gravity.

The saponification value indicates the average molecular weight/chain length of all fatty acids present. Saponification value of *Ashwagandha Ghrita 1* is 226.25, *Ashwagandha Ghrita 2* is 240.42, *Ashwagandha Ghrita 3* is 234.44. The longer chain fatty acids have a low saponification value and the shorter chain fatty acids have a high saponification value. Shorter chain fatty acids have faster rate of absorption than longer chain fatty acids. *Ashwagandha Ghrita 1* has got lesser saponification value and *Ashwagandha Ghrita 2* has the highest saponification value.

It was noted that ICP – OES of *Ashwagandha Ghrita 2* showed 4.92 mg/Kg of Mercury, 0.56 mg/Kg of Sulphur and 7.50 mg/Kg of Copper and of *Ashwagandha Ghrita 3* showed 0.61 mg/Kg of Mercury, 0.36 mg/Kg of Sulphur and 0.34 mg/Kg of Copper. Here the amount of heavy metals is more in *Ashwagandha Ghrita 2* when compared with *Ashwagandha Ghrita 3*. But the quantity of heavy metals is within the safe limit for both AG 2 and AG 3.

It was observed that the heavy metals in *Ashwagandha Ghrita 2* and 3 was within the limits. So it is safe for usage.

CONCLUSION

Sneha Kalpana is one of the unique preparations where both fat soluble and water soluble active principles are extracted. *Ashwagandha Ghrita* was prepared by two methods. In the first method (AG 2), all the *Kalka Dravyas* (*Ashwagandha Churna*, *Musta Churna*, *Rasasindura* and *Tamra Bhasma*) were added initially. In the second method (AG 3), the *Kalka Dravyas* *Ashwagandha Churna*, *Musta Churna* was

added initially. *Rasasindura* and *Tamra Bhasma* was added just before paka. Preparation of *Rasasindura* using Muffle Furnace was easy when compared to classical method of preparation. The prepared *Rasasindura* was found to pass the *Bhasma Pareeksha*. In classical method, it was mentioned *Tamra Bhasma* can be obtained in 3- 5 putas, but it took 18 putas to obtain *Tamra Bhasma*. Depending upon the nature of liquid one should follow different time duration for the preparation of *Sneha*. In this study, *Ashwagandha Ghrita 1*, *Ashwagandha Ghrita 2* and *Ashwagandha Ghrita 3* were prepared in 2 days. Preparation of *Ashwagandha Ghrita 2* was more easy as chances of charring was very less. Yield was more in *Ashwagandha Ghrita 2* (900 ml). Physico-chemical parameters describes that Saponification value was more in *Ashwagandha Ghrita 2* (240.42). This implies that *Ashwagandha Ghrita 2* have faster rate of absorption than the other two *Ghritas*. AAS of *Ashwagandha Ghrita 2* & 3 showed that both the *Ghrita* had heavy metals within the limits. ICP – OES of *Ashwagandha Ghrita 2* & 3 showed that the heavy metals was within the limits.

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