

Pharmaceutico Analytical Study of Kushtaghni Sura

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ABSTRACT:Background: The utility of Sura in therapeutics is almost non-existent though its Prayoga in Brihatrayi is immense. Yet another Madya Kalpana Asava along with Arishta can be seen in every Vaidya's prescription regularly. The reason for this contrary practice is the non-availability of Sura in market and the method of preparation is less known. Hence, this work was taken up to establish a Standard Operative Procedure for Sura, particularly Paishti Sura. **Materials & Methods:** Literature review at multiple stages. 6 batches of Surawith variations in Kashaya ratio, method of Ushma Paka were prepared. **Results:** Organoleptic, and physicochemical analysis were done. **Discussion:** Elaborate discussion on segments of pharmaceutical study such as proportion of water, proportion of Kwathya Dravya, Preparation of Kinva, Pishta, onset and offset of fermentation, Sura denotation, Mana Paribhasha. **Conclusion:** Kushtaghni Sura is a Paishti type of Sura prepared with Mandodaka and Kinva. Batch 6 can be considered as the reference batch in terms of methodology as well as test results for further researches. Further standardization with respect to Drava (Kashaya) and Kinva ratio is required for complete understanding of the procedure.

Keywords: Sura, Kushta, Ushma Paka, Kinva, Pishta, Mandodaka, Sushruta Samhita, Mana Paribhasha

I. INTRODUCTION:

The article is the summary of the dissertation work done under the same title.

Dissertation work on 'Pharmaceutical development of Sugar-free Asavarishtas' was in progress and in the middle of the process a Yoga named 'Kushtaghni Sura'[1], termed by Bhashajya Samhita came into light.

The original reference of this Yoga is from Sushruta Samhita, Mahakushta Chikitsa[2]. It is indicated not only in Kushta but also in Meha, Kaphamaya, Daruna Sarvanga Shophya, Medura striving for Krishatva. The references for usage of Sura in various dosage forms are numerous. However, number of Yoga per se are little to none. Irrespective of its significance in Chikitsa, the Prayoga of Sura in practice these days is a rare sight contrary to extensive Prayoga of Asavarishtas which is also another Madya Kalpana like that of Sura.

In consideration of the above, an attempt was done to develop a Method of Preparation of Sura which can be an asset for a lot of future works.

II. MATERIALS AND METHODS:

Literature Review: Done mainly under the headings of drug review and formulation review. The drug review includes all ingredients with Synonyms of the drugs, their Guna-Karma according to different Nighantu, Vernacular names, morphology and the like. Formulation review includes Guna-Karma of various Sura and associated Kalpana, different layers of Sura, Sura Prayoga in Ashtanga Ayurveda with special reference to Sushruta Samhita.[3]

Pharmaceutical Study: The details of method of preparation of every batch with precautions, observations have been recorded.

Table 1: Ingredients of Kushtaghi Sura[2],[4]

SL. NO	SAMSKRUTA NAMA	BOTANICAL NAME	PRAYOJYA ANGA
1.	Shimshapa	Dalbergia sissoo Roxb.	Sara
2.	Khadira	Acacia catechu (Linn.f.) Willd.	Sara
3.	Uttamarani (Shatavari)	Asparagus racemosus Willd.	Kanda
4.	Brahmi	Bacopa monnieri Wetts.	Panchanga
5.	Koshavati (Devadali)	Luffa echinata Roxb.	Phala
6.	Shali	Oryza sativa Linn.	Dhanya
7.	Masha	Vigna mungo Linn.	Dhanya

Table 2: Kwathya Dravya and Kinva various proportions for each batch[4]

BATCH NO.	KWATHYA DRAVYA	KINVA
1.	400g – each	Shali+Masha = 50g each (1/8 th) Shalitandula Churna = 300g (3/4 th)
2.	200g – each	Shali+Masha = 25g each (1/8 th) Shalitandula Churna = 150g (3/4 th)
3.	Shimshapa+Khadira = 150 ml each (Bhaga Dvayam) Shatavari, Brahmi, Devdali = 50 ml each (Eka Bhaga)	Shali+Masha = 75 ml each (1 Bhaga) Shalitandula Churna = 450 ml (3 Bhaga)
4.	Shimshapa+Khadira = 300 ml each (Bhaga Dvayam) Shatavari, Brahmi, Devdali = 100 ml each (Eka Bhaga)	Shali+Masha = 150 ml each (1 Bhaga) Shalitandula Churna = 900 ml (3 Bhaga)
5.	Shali+Masha = 133.3 g each (Bhaga Dvayam) Shalitandula Churna = 44.4 g (Eka Bhaga)	Shali+Masha = 66.5 g each (1 Bhaga) Shalitandula Churna = 400 g (3 Bhaga)
6.	Shali+Masha = 1.6 kg each (Bhaga Dvayam) Shalitandula Churna = 533 g (Eka Bhaga)	Shali+Masha = 800 g each (1 Bhaga) Shalitandula Churna = 2400 g (3 Bhaga)

Table 3: Gist of pharmaceutical journey of reaching to a probable sample preparation

BATCH NO.	01	02	03	04	05	06
KASHAYA (Dravya:Jala)	1:4 → 1/4 th Remaining	1:4 → 1/4 th Remaining	1:10 → 1/4 th Remaining	1:10 → 1/4 th Remaining	1:10 → 1/4 th Remaining	1:10 → 1/4 th Remaining

PISHTA (Shalitandula Churna)	Steel plate with holes hung with the help of iron rod	A Stainless-Steel hole Chalni	Dola Yantra Vidhi Pottali Swedana	Steam momo maker – Cotton cloth Pottali	Steam momo maker – Kadalipatra Pottali	Pressure Cooker
KINVA (Shali Masha) +	Shali pounded and given Bhavana & Masha added to this, pounded and given Bhavana	Shali pounded and given Bhavana & Masha added to this, pounded and given Bhavana	Shali & Masha were pounded together and given Bhavana	Shali and Masha pounded separately and given Bhavana together	Shalitandula Prakshalana, Masha Bhavana → Pounded separately & mixed together	Shalitandula Prakshalana, Masha Bhavana → Pounded separately & mixed together
INITIAL QUANTITY	1000 ml	1000 ml	1040 ml	1000 ml	1 kg	1 Drona (12 kg)
FINAL QUANTITY	650 ml	410 ml	460 ml	510 ml	---	6.612 kg
YIELD %	65%	41%	44.23%	51%	---	55.1%

III. RESULTS:

Table 4: Organoleptic Characters of all the prepared batches

Batch No.	Roopa (Varna) [Colour]	Gandha [Odour]	Rasa [Taste]	Sparsha [Consistency]
Batch 1	Madhu Varna	Madhugandhi	Tikta Pradhana Amla	Aghana Drava, Sheeta Sparsha
Batch 2	Madhu Varna	Madhugandhi	Tikta - Amla	Aghana Drava, Sheeta Sparsha
Batch 3	Madhu Varna	Madhugandhi	Amla Pradhana Alpa Tikta	Aghana Drava, Sheeta Sparsha
Batch 4	Peetabha	Madhugandhi	Amla - Tikta	Aghana Drava, Sheeta Sparsha
Batch 6	Peetabha	Madhugandhi	Amla – Tikta Madhura Anurasa	Aghana Drava, Sheeta Sparsha

Table 5: Comparison of Physicochemical Parameters of all prepared batches

Parameter	Batch 1	Batch 2	Batch 3	Batch 4	Batch 5 (DISCARDED)	Batch 6 (Master Batch)
Alcohol content	0.46	0.45	NIL (1.5%) *	NIL (1.5%) *	N/A	0.89 (2%) *
pH value	3.12	3.18	3.10	3.08	N/A	3.69
Total solids	-	-	3.256	3.27	N/A	2.82 (percent by mass)
Total sugar content	NIL	NIL	NIL	NIL	N/A	18.6
Reducing sugars	NIL	NIL	NIL	NIL	N/A	17.68
Non-reducing sugars (percent)	NIL	NIL	NIL	NIL	N/A	0.92
Specific gravity	-	-	1.01	1.01	N/A	1.006
Refractive index	1.345	1.340	1.345	1.34	N/A	1.321

*Obtained by Hydrometer

Table 6: Results of Microbiology test values conducted at QA/QC of Sri Sri Tattva, Sriveda Sattva Pvt. Ltd

TEST	RESULTS	SPECIFICATION	TEST METHOD
Microbiology Test:			
E. coli	Absent	Absent /10g	Indian Pharmacopoeia
Salmonella spp.	Absent	Absent /10g	Indian Pharmacopoeia
Staphylococcus aureus	Absent	Absent /10g	Indian Pharmacopoeia
Shigella spp	Absent	Absent /10g	Indian Pharmacopoeia
Pseudomonas aeruginosa	Absent	Absent /10g	Indian Pharmacopoeia
Total Microbial Plate Count	70000 CFU/ml	NMT 100000 CFU/ml	Ayurvedic Pharmacopoeia
Total Yeast and Mold	3000 CFU/ml	NMT 500 CFU/ml	Ayurvedic Pharmacopoeia

Note: The specification values mentioned here are for general Asava & Arishta. The reason for exceeding value of total yeast and mold may be the Dhanya media of (Shali+Masha) Sura. Therefore, plenty of future works are needed to set specification values for Sura.

IV. DISCUSSION:

PROPORTION OF WATER:

- ❖ Acharya Sushruta quotes “Kashaya Kalpena”[2] meaning confirming to Kashaya Kalpa, while mentioning the method of preparation of Kashaya for the Sura.
- ❖ Bheshaja Samhita says the proportion as 4 times water than the medicinal plants’ quantity.
- ❖ As a general instruction for Kashaya Dravya Acharya Sushruta has mentioned in Chikitsa Sthana as 8/16 parts of water.[5]
- ❖ Acharya Dalhana’s Teeka of this specific Sutra gives the ratio in the commentary: 10 (10.24) times[2] which was adopted and accepted as the proportion to be taken.

PROPORTION OF KWATHYA DRAVYA:

- ❖ At the start of pharmaceutical study, the first two batches were prepared as per Bheshaja Samhita where all were taken in equal weight (Batch 1) and volumetric jar (Batch 2) subsequently.
- ❖ Further, Dalhana Teeka[2] guided to take the Shimshapa and Khadira Sara = 2 parts each (due to their Kushtahara Prabhava). Rest Dravya viz. Shatavari, Bramhi and Devadali to be taken as combined 1 part.
- ❖ Accordingly, 4 batches (Batch No. 3,4,5,6) out of total 6 batches were prepared thus.

PREPARATION OF PISHTA

- ❖ Pishta is the Shalilandula Churna cooked in Ushma.[4] The term used by Acharya is ‘Ushmasadhitam’. Various methods were adopted to come to a conclusion about the appearance of Shalilandula Churna after steam cooking.
- ❖ In first 2 batches the set-up was made with the help of Stainless-Steel hole Chalni placed over the Kashaya vessel.
- ❖ In the 3rd batch it was tried with Pottali method.
- ❖ For the 4th and 5th batches, they were conducted in Momo steam maker with cloth and banana leaves as Pottali making materials and the 6th main batch needed the Pressure cooker due to a large quantity of Churna.

All the above methods of Ushma Paaka seem to be fruitful and cooking of Churna is achieved up to some extent wherein Churna holds shape and becomes softer. None of these methods resulted in paste like consistency of Churna.

PREPARATION OF KINVA:

The combination of Shali and Masha is the Kinva Bhaga.[4]

- ❖ First 4 batches: Shali and Masha were pounded and given Bhavana with prepared Kashaya. (Here the Kashaya was filtered and taken from the total Kashaya getting prepared to be kept for Sandhana after it got the first boil.)
- ❖ Batches 5 & 6: With deeper digging and proper interpretation of Shastra the knowledge got surfaced that Shali needed Prakshalana^[6] and Masha needed the Bhavana.^[6]

ONSET, DURING AND OFFSET OF FERMENTATION:

Onset of fermentation:

It is customary to tie a cloth at the neck of Sandhana Patra until fermentation begins which is usually confirmed with extinguishment of match stick when stroked and held at the mouth of Sandhana Patra. This was tried in first 2 batches assuming Sura also just like any other Asava or Arishta. But fire was not put out even after 7 days after keeping for Sandhana.

Therefore, in the consequent batches Sandhana Patra was closed with lid on the same day as placement of Sandhana. The large mouths of acrylic jar and glass jar may interfere with typical movement of gases during fermentation and could be the reason for contrary outcome with respect to match stick test.

Interestingly, in the master batch as the Sandhana Patra chosen was a water storage can, mouth was a narrow one. Hence, to check and conclude if Sura also abides by the match stick test, a hole was made in the lid and closed with a cloth on top of it. On the 3rd day after placing for Sandhana, the match stick test was conducted and it was put out indicating the onset of fermentation.

During fermentation:

The 5 layers of Sura were observed in all the batches and would form within 8-10 days after placement of Sandhana. Formation and movement of gas bubbles were evidently seen only in the master batch. Whether or not Alodana is required was an ambiguity which were tried in different batches. In Batch No. 1, 4, 6 it was done based on

presence of gas bubbles and in Batch No. 2, 3 it was not.

It can be said that Alodana is essential for uniform process through solid and liquid layers of Sura as well as for better yield which is supported by Vaidyabhushan Pawani Prasad Sharma.[7]

❖ Offset of fermentation:

Jatarasam[4] is the term given to know the completion of Sandhana in Kushtaghni Sura. Jatarasam can be understood with 3 criteria:

1. 'Jate Rasam' – meaning having taste or flavour. Here, acquiring Amla Rasa[8] due to process of Sandhana which gives predominant Amla Rasa[9] along with Tikta Rasa and Madhura Anurasa was well appreciated.
2. Duration of Sandhana – 1 Masa[10],[11]
3. Smell of final product – Madhugandhi[12]

In brief, with regard to match stick test;

It was noted in all the batches when liquid was filtered and kept separately in a container and tested on the next day, the match stick continued to burn indicating completion of fermentation.

But, in the Kinva of the same batch the match stick would put out even after 2 months of Sandhana showing its potential to lead the formulation towards secondary fermentation because of Ardha Pakva (half cooked) Dhanya as they receive only Ushma Paka and Bhavana with Kashaya.

Based on ingredients Sura is classified as:[13]

1. 'Goudi' – Guda as base ingredient
2. 'Madhvi' – Madhu as base ingredient
3. 'Paishhti' – Pishtha as base ingredient
4. 'Sharkari' – Sharkara as base ingredient

Based on Dhatu-Dhatvartha and Sura Nirmana Vidhana it can be understood as:

1. Sandhana done in Madhura Dravya medium followed by Sravana
2. Sandhana done in Shali and/or Dhanya medium

Kushtaghni Sura can be considered under the category of Sandhana done in Shali/Dhanya medium. But because of valid other meanings, distillation was attempted of the first batch Sura. The resultant product had neither agreeable odour nor taste like that of the original product. Nevertheless, it was stored and kept for observation. After 2 months when it was checked the odour as well as the taste had changed and was

comparatively pleasant. This may suggest that both processes:

1. Sandhana alone in Dhanya medium,
2. Parisravana following Sandhana in Madhura / Dhanya medium are rational.

However, this can be well founded only after their Prayoga in Chikitsa.

UNDERSTANDING MANA PARIBHASHA:

1. Acharya Dalhana in Teeka of Kushtaghni Sura Yoga has specified 'Tula' measurement for Kwathya Dravya, 4 'Drona' for Udaka and Kashaya prepared from this should be reduced to 1 'Drona'. Here we can notice that not only Ghana Dravya but also Drava Dravya has been referred with identical mode of measurements.
2. As per the reference of Vaidyaka Mana, 'Tula' = 6 Ser 53 Tola 4 Mase, 'Drona' = 17 Ser 5 Tola 4 Mase[14] which are all measures of weight as elicited in Drashtavya[15] of the same book.
3. Although 2 batches (Batch No. 3 & 4) were done in volumetric measurements anticipating lesser Tikta Rasa in the final product but with no difference.

Ultimately considering all the above points it can be determined that all ingredients in a Yoga including Ghana, Drava can be taken in weight.

V. CONCLUSION:

Kushtaghni Sura, a Paishti form of Sura is one among the very few expounded Sura Yoga. This Sura contains 3 components: Mandodaka from Kashaya, Kinva from Shali and Masha and Pishtha from Shalitandula Churna. Jatarasam – obtainment of Amla Rasa and Madhugandhi can happen within a duration of one month. Once these Lakshana are observed the Sura can be considered as fit for Chikitsa. Batch 6 can be accounted as a probable Standard Operative Procedure of Kushtaghni Sura and its analytical test results as reference values for further research.

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Photos:**KASHAYA PREPARATION**

USHMAPAKA METHODS FOR PISHTA NIRMANAM



PISHTA



SHALI-MASHA PINDA NIRMANA VIDHI



KINVA PREPARATION



PATRA SAMSKARA



DIFFERENT BATCHES OF KUSHTAGHNI SURA



DISTILLATION OF SURA SAMPLE



FIVE LAYERS OF SURA

