WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 13, Issue 1, 1586-1605. Research Article ISSN 2277– 7105

PHARMACEUTICO- ANALYTICAL STUDY OF RAKTA STHAPANA CHURNA

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Article Received on
15 November 2023,
Revised on 05 Dec. 2023,
Accepted on 25 Dec. 2023
DOI: 10. 20959/wjpr20241-30856

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ABSTRACT

Rakta Sthapana Churna is an Ayurvedic formulation designed for external application during *Rakta Mokshana* to address *atipravarthana* or bleeding tendencies. The research aims to evaluate the pharmaceutical and analytical aspects of this formulation, considering its potential applications in haemorrhagic disorders. **Aims & Objectives**: The primary aim of this study is to conduct pharmaceutical and analytical studies on *Rakta Sthapana churna*, a compound formulation for modulating the blood flow. **Materials & Methods**: The pharmaceutical study involves preparation of churnas of all the herbal ingredients, *Gairika shodhana*, *Kanji* preparation, *shankha-shukti shodhana* and its *churna* preparation, preparation of *Rasanjana*, and finally the compound *churna* preparation. The analytical study comprises organoleptic, physicochemical, and chromatographic evaluations. **Results**: The preparation of *Rakta Sthapana Churna* involved continuous trituration, resulting in a light brown coloured churna with an odour predominantly of *Sarjarasa*, *Rasanjana* & *Godhuma*, possessing *Madhura-kashaya-tikta rasa*. The quantity obtained was 650g. Analytical parameters and HPTLC provided relatable results. **Discussion:** The pharmaceutical study

involves size reduction and separation principles. *Gairika shodhana* highlights the importance of selecting appropriate *shodhana* method. *Shankha churna* preparation explores commentary-based insights in Ayurvedic pharmaceutics. Organoleptic evaluation shows *kashaya rasa*, associated with *sthambhana* property, along with *guru guna* of madhura rasa, which could contribute to the *rakta sthapana* or blood-stabilizing effect. HPTLC demonstrates distinct compound patterns. **Conclusion**: The study offers the standardization of *Rakta Sthapana Churna* & provides a foundation for further research in the field of Ayurvedic preparations pertaining to haemostasis.

KEYWORDS: *Rakta sthapana, atipravarthana*, haemorrhagic disorders, pharmaceutical, analytical, standardization.

INTRODUCTION

Haemorrhagic disorders are characterized by an increased tendency to bleed, due to defects in the clotting process. Haemophilia, von Willebrand disease, and acquired platelet disorders are examples of haemorrhagic disorders. These conditions can arise from genetic mutations, liver diseases impairing clotting factor synthesis, or medication-induced platelet dysfunction. Haemorrhagic disorders can manifest as spontaneous bleeding, easy bruising, prolonged bleeding after injury or surgery, or uncontrolled bleeding during menstruation or childbirth. Severe cases can lead to life-threatening haemorrhages, including intracranial bleeding or gastrointestinal bleeding.

Ayurveda, the ancient Indian Life science and system of medicine has elaborate discussions on *Rakta dhatu*, its functions in normalcy, signs and symptoms on vitiation, its disorders, their treatment strategies, and efficient therapeutic formulations. In this context, *Rakta mokshana* is stated to be the prime modality of treatment for *raktaja vyadhis*,[1] and to ensure that *raktamokshana* does not lead to complications by preexisting abnormal bleeding tendencies due to *rakta dushti*, a set of herbo-mineral drugs for *Rakta sthapana* activity has been mentioned by Acharya Sushrutha.[2] This formulation is prepared in the form of *churna* and intended for external application on the site of *raktamokshana*. Considering a broader perspective, this formulation may find further application in bleeding disorders, and as an initial step its pharmaceutical & analytical evaluation is undertaken in the present study.

AIMS AND OBJECTIVES

Rakta sthapana churna, a polyherbo-mineral formulation with potential modulatory action on the blood coagulation mechanism is taken up for the present study. This work includes pharmaceutical and analytical studies on *Rakta Sthapana churna*.

MATERIALS AND METHODS

PHARMACEUTICAL STUDY

- Pharmaceutical source: Raw drugs required for the preparation of *Rakta Sthapana Churna* were collected from SDM Pharmacy, Udupi and authentication is done by the subject experts at Sri Dharmasthala Manjunatheshwara College of Ayurveda, Udupi.
- The preparation of *Rakta Sthapana Churna* was carried out in practical hall of dept. of Rasa Shastra & Bhaishajya Kalpana, SDMCA, Udupi.
- *Rakta Sthapana Churna*, a formulation from *Sushruta Samhita* was prepared according to general principles of *Sharngadhara Samhita*.

Table 1: Ingredients of *Rakta Pravarthana Churna.*

Drug name	Botanical name/ Source	Family	Part Used	Ratio
Lodhra	*Symplocus racemosa Roxb.*	Symplocaceae	Stem bark	1 part
Madhuka	*Glycyrrhiza glabra Linn.*	Fabaceae	Root	1 part
Priyangu	*Callicarpa macrophylla Vahl.*	Verbenaceae	Root, bark	1 part
Raktachandana	*Pterocarpus santalinus Linn.*	Fabaceae	Heartwood	1 part
Gairika	*Red ochre – Ferrum haematite*	Not applicable		1 part
Sarja rasa	*Vateria indica Linn.*	Dipterocarpaceae	Resin	1 part
Rasanjana	*Extract of Berberis aristata decoction processed with milk*	Not applicable		1 part
Shalmali	*Salmalia malabarica*	Bombocaceae	Flower	1 part
Shanka	Animal origin: *Turbinella pyrum*	$CaCO_3$	Conch shell	1 part
Shukti	Animal origin: *Margaritifera*	$CaCO_3$	Oyster shell	1 part
Masha	*Vigna mungo*	Leguminosae	Grain	1 part
Yava	*Hordeum vulgare*	Gramineae	Grain	1 part
Godhuma	*Triticum aestivum*	Poaceae	Grain	1 part

- Preparation of *Rakta Sthapana Churna* includes

1. Preparation of churnas of *Lodhra, Madhuka, Priyangu, Raktachandana, Sarjarasa, Shalmali, Masha, Yava and Godhuma*.
2. *Gairika Shodhana*
3. Preparation of *Kanji*
4. *Shanka Shodhana* and *Shukti Shodhana*
5. Preparation of *Shanka Churna* and *Shukti Churna*

6. Preparation of *Rasanjana*
7. Preparation of *Rakta Sthapana Churna*

Step1: Preparation of Churna of *Lodhra, Madhuka, Priyangu, Raktachandana, Sarjarasa, Shalmali, Masha, Yava, Godhuma*

Reference: *Sharangadhara Samhita*.[3]

Equipment: *Tulayantra, ulukhala yantra*, grinder, sieve, vessels

Principle involved: Size reduction Size separation

Method of preparation: The drugs were collected in required quantities and dried completely. Then the dried drugs were then taken separately and pounded manually in *ulukhala yantra* and further powdered using mixer grinder; it was then filtered through sieve to obtain uniform fine powder. *Masha, Yava* and *Godhuma churna* were procured from the reliable market sources and were examined for impurities and later sieved to obtain uniform fine powder. The churnas were weighed and stored in separate labelled airtight containers.

Step 2: Gairika*: Shodhana* by *Goghrita Bharjana* Method

Reference: *Ayurveda Prakasha*

Equipment: *Tulayantra, loha darvi*, Spatula, gas stove, *Khalvayantra*, sieve, steel vessels

Ingredients: *Ashuddha Gairika churna, Goghrita*

Principle involved: Roasting, oxidation, size reduction

Method of preparation: *Gairika* was taken in a clean and dry *khalvayantra* and made into a fine powder. *Goghrita* was taken in a *loha darvi* and subjected to mild heat. Then fine powder of *Gairika* was added to it little by little and *bharjana* was started on mild heat. The *bharjana* was continued till all the *Gairika* lumps resolved completely, and the colour of *Gairika* changed from brick red to dark brown. Then Gairika was dried, grinded and sieved to obtain a fine powder which was stored in well-labelled airtight containers.

Step 3: Preparation of *Kanji for Shankha & Shukti shodhana*

Reference: *Vaidika Paribhasha Pradipika*[4]

Equipment: *mrutpatra, sharava, vastra,* gas stove, steel vessels, measuring glass, knife.

Ingredients: *Shali* (rice), *mulaka* (*Raphanus sativus Linn.*), *jala* (water).

For *dhupana karma*: *Ushira, Sarshapa, Haridra, Vidanga, Karpura*

Method of preparation: At first the required size of mud pot for preparing *kanji* was taken, washed, dried and then fumigated by *dhupana karma*. Required quantity of rice was taken, washed in water. Fresh well grown radish was washed and cut into small pieces. Then the radish, rice, and water were added in a stainless-steel vessel and kept for boiling on medium fire. After proper boiling, it attained to a *manda* consistency at which state the heating was stopped and it was left for self-cooling. The preparation was then transferred to the fumigated pot and its mouth was closed with an appropriate lid and *sandhibandhana* was done by closing the edges by tying a cloth around it. The pot was kept undisturbed in dark place and devoid of wind for 3 days. It was then filtered through khora cloth, stored in the pot again until it developed *amlata* and other *siddhi lakshanas*. It was checked regularly for *siddhi lakshanas* and after attainment it was stored for further pharmaceutical procedures.

Observations: The *kanji* took nearly 75-80 mins to get completely cooked. The *kanji* had attained a very strong odour while filtering it at the end of 3 days.

Table 2: *Siddi lakshanas* of *kanji.*

Color	**White**
Taste	Sour (*amla*)
Smell	Strong odour
Bubbles/ effervescence	Appeared
Flame test	Positive

Step 4: *Shankha Shodhana and Shukti Shodhana*

Reference: *Rasatarangini.*[5,6]

Method: *Shodhana* of *shankha and shukti* is done by *swedana* method in *dolayantra,* using *kanjika* as drava dravya, and heating for 1 *yama* (3 hours).

Equipment: *khalva yantra, tulayantra, ulukhala yantra, vastra*, gas stove, iron rod, measuring glass, vessels.

Ingredients: *Ashuddha Shankha* - 191g; *Ashuddha Shukti* - 98g; *Kanjika* - Q.S (3 to 4 litres)

Method of preparation: *Ashudha shankha* and *Ashuddha shukti* were taken and pounded separately into smaller pieces manually using *ulukhala yantra*. The pieces of *shankha* were then tied in a bundle of cloth forming a *pottali;* likewise, another *pottali* containing *shukti* was made. These *pottalis* were then tied to a rod, well-spaced and apart from each other. The rod to which the *pottalis* were tied was placed at the mouth of a stainless-steel vessel such that the *pottalis* hung from it into the steel vessel. The steel vessel was then filled with *kanji* such that the pottalis were fully immersed. *Swedana* was done for 3 hours on *madhyama*

agni. To keep the *pottalis* submerged, the *kanji* was periodically added to the vessel. After 3 hours, both the *pottalis* were taken out and its contents were removed. The pieces of *Shankha* and *Shukti* from within the *pottalis* were then washed separately with hot water for 2-3 times thoroughly. The *shudha shankha* and *shuddha shukti* were later stored in separate airtight containers for further procedures.

Observation: *Ashuddha shankha* was greyish white in colour, *Ashuddha shukti* was greyish white in colour with a slight creamy shade. *Shankha* became shiny, bright white and slightly brittle after *shodhana*, while *Shukti* became bright white and more brittle than before.

Step 5: Preparation of *Shankha Churna and Shukti churna*

Reference: *Sharangadhara Samhita Adhamalla commentary*[7]

In Sharangadhara Samhita Uttarakhanda 11th chapter a formulation named *Romashatana Lepa* is explained, which contains *Shankha churna* as one of the ingredients. To this, Acharya Adhamalla in his Deepika commentary mentions that *Shankha churna* implies *bharjita shankha churna* which has to be taken here. Hence it is understood that when *shankha* is mentioned as churna and not *Bhasma* especially for external applications, *shuddha shankha* has to be subjected to *bharjana* and used. And since *Shankha* & *Shukti* both being *Sudha varga dravyas* and having similar methods for *Shodhana and Marana*, *bharjana* is taken up for both *Shuddha shankha & shuddha shukti* to obtain *shankha churna* & *shukti churna* respectively.

Method: Bharjana of Shuddha shankha churna and Shuddha shukti churna.

Equipments: *Ulukhala yantra, tulayantra, vastra,* vessel, sieve, loha patra, darvi, gas stove, sharaava.

Ingredients: *Shuddha Shankha, Shuddha Shukti.*

Method of preparation: S*huddha shankha* was pounded in *ulukhala yantra* & then taken in a wide mouthed *loha patra*. This *loha patra* was heated on a gas stove at *mandagni*. The *shankha churna* is occasionally stirred and mixed using a *darvi*. The heating is continued till the *shankha churna* attains a *visheerna avastha*, i.e a shrunken state and its colour changes to greyish white. Heating is then stopped and a *sharaava* (earthern lid) is simply placed above the *loha patra* to cover it and allow the shankha churna for *swangasheeta*. After *swangasheeta*, the *shankha churna* is collected, pounded and sieved to get a uniform fine

powder. The obtained *shankha churna* is weighed and stored in air-tight container for further use. The same procedure is carried out separately for *Shuddha shukti* to obtain *Shukti churna*.

Observation: Before *bharjana* the *shankha* and *shukti churna* were bright white in colour and heavy in nature. During *bharjana* both *shankha* and *shukti churna* reduced in volume and their appearance started changing from being shiny to pale. The process took about 3 hours for the proper *bharjana* of *shankha churna*, while it took about 2-2.5 hours for *shukti churna*. At the end of *bharjana* both *shankha* and *shukti churna* became dry in texture and greyish-white in colour.

Step 6: Preparation of *Rasanjana (Daruharidra Rasakriya*)

Reference: Ayurveda Prakasha[9], Sharangadhara Samhita[8]

Equipments: *Ulukhala yantra, tula yantra*, pulveriser, grinder, stainless steel vessel, Gas stove, sieve, spoon

Ingredients: *Daruharidra (*1.5 kg), Water - 8 parts of water reduced to ¼th (12l reduced to 3l), Goats milk - equal to kwatha (3 litres)

Principle involved: Extraction – Decoction, and concentration.

Method of Preparation: *Daruharidra* was taken, thoroughly cleaned, dried and made into coarse powder using a pulverizer. It was then placed in a stainless-steel vessel and soaked with water just enough to immerse it and left over night. The next day, 8 parts of water was added to it and boiled over moderate fire. After reduction to 1/4th of the original volume, the *Kwatha* was then filtered into a separate container. *Aja Ksheera* was taken in another fresh vessel and heated, then added to the *Daruharidra kwatha*. This mixture was then further heated on mild fire. As the water content evaporates and liquid starts getting thicker, the stirring was carried out continuously. After complete evaporation of water content, the product was similar to *leha* and the heating was then stopped, & left in the same vessel for self-cooling. Due to temperature of the heated vessel, it attained solid granule-like form. After complete cooling, final product was properly dried, grinded, and sieved to obtain the powder form of *Rasanjana*, which was then stored in air-tight containers.

Observation: *Kwatha* preparation took about 8.5 hours of time. After adding *Aja Ksheera* to the *kwatha* and boiling it, the colour changed from blackish-brown to creamy yellow. The

Rasanjana granules were brownish yellow in colour, slightly unctuous to touch and had a characteristic smell.

Step 7: Preparation of *Rakta Sthapana Churna*

Reference: Sushruta Samhita[2]

Equipments: *Tula yantra, khalva yantra*, vessel, spoon, plastic containers

Ingredients: Equal quantity of the churnas of *Lodhra, Madhuka, Priyangu, Raktachandana, Shuddha Gairika, Sarjarasa, Rasanjana, Shalmali, Shuddha Shankha, Shuddha Shukti, Masha, Yava, Godhuma.*

Principle involved: Mixing and homogenisation.

Method of preparation: Equal quantity of all the ingredients of Rakta sthapana churna are taken in *khalva yantra* one by one and *mardana* is done to mix the ingredients together. It is then mixed again using spoon or spatula. The prepared *churna* is weighed and then stored in airtight plastic containers.

Precaution: The *churna* should be in homogenous form, hence continuous trituration and mixing is necessary. While adding and mixing the individual powders, it must be ensured that all the equipment used are free from any dust and moisture. The final *churna* is immediately stored in airtight plastic containers.

ANALYTICAL STUDY: The analytical study plays a pivotal role in guaranteeing the quality, safety, and effectiveness of Rakta Sthapana Churna. It encompassed organoleptic, physicochemical, and chromatographic assessments, examining ash value, acid insoluble ash, water-soluble ash, water and alcohol extractive values, and loss on drying. HPTLC was utilized for chromatographic analysis.

RESULTS

Observations: Continuous thorough trituration is required for making a homogenous mixture. The colour and smell of the mixture undergoes a change with the addition of each component *churna*. At the end, *Rakta sthapana churna* was light brown coloured fine powder. It has a mixed odour, predominantly of that of *Rasanjana* and *Godhuma*.

Table 2: Results of *Rakta Sthapana Churna* preparation.

Drug	Quantity
Lodhra, Madhuka, Priyangu, Raktachandana, Shuddha Gairika, Sarjarasa, Rasanjana, Shalmali, Shuddha Shankha, Shuddha Shukti, Masha, Yava, Godhuma	50g of each drug taken
Rakta Sthapana Churna	Quantity obtained **650g**

Table 3: Organoleptic characteristics.

Organoleptic characteristics	***Rakta Sthapana Churna***
Colour	Light brown
Taste	*Madhura, Kashaya, tikta*
Smell	Characteristic, predominantly of *Sarjarasa, Rasanjana, Godhuma*
Consistency	Fine powder

Table 4: Results of analytical parameters.

Parameter	Results (Avg±SD)
Loss on drying	6.07±0.02
Total Ash	25.56±0.67
Acid Insoluble Ash	0.36±0.01
Water soluble Ash	0.97±0.00
Alcohol soluble extractive value	11.26±0.01
Water soluble extractive value	17.13±0.01

Chromatography -HPTLC

Table 5: R_f values of Ethanol extract of Rakta Sthapana Churna.

Short UV	Long UV	White light	Post derivatisation
-	0.07 (F.blue)	-	0.09 (Purple)
-	0.15 (F.blue)	-	-
-	-	-	0.18 (Purple)
-	0.20 (F.blue)	-	-
-	-	-	-
-	-	-	-
-	-	-	0.32 (Purple)
-	-	-	-
0.48 (Green)	0.45 (F.blue)	-	-
-	-	-	0.51 (Purple)
-	0.55 (F.blue)	-	-
-	0.63 --(F.blue)	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

*F – Fluorescent; L –Light; D – Dark

Preparing herbal drugs churna for *Rakta Sthapana Churna*	
	
Fig 1: *Lodhra* raw drug	**Fig 2: *Madhuka* raw drug**
	
Fig 3: *Priyangu* raw drug	**Fig 4: *Raktachandana* raw drug**
	
Fig 5: *Sarjarasa* raw drug	**Fig 6: *Shalmali* raw drug**

Fig 7: *Masha* raw drug

Fig 8: *Godhuma* raw drug

Fig 9: *Yava* raw drug

Gairika shodhana	
	
Fig. 10: ***Ashuddha Gairika churna.***	
	
Fig. 11: ***Ghrita bharjana*** **of** ***Gairika.***	**Fig. 12:** ***Gairika*** **after** ***bharjana.***

Shankha Shodhana **and** ***Shukti Shodhana***	
	
Fig. 13: ***Ashuddha Shankha***	**Fig. 14:** ***Ashuddha Shukti***
	
Fig. 15: Pounding to make into small pieces.	**Fig. 16: Tying pottali.**

Fig 17: *Shankha* & *Shukti Swedana* in *dolayantra.*

Fig 18: *Shuddha shankha* and *shukti* appear white.

Preparation Of *Bharjita Shankha Churna*

Fig. 19: *Shuddha Shankha* & *Shukti churna* before *bharjana*

Fig. 20: *Bharjita Shankha & Shukti churna* after *visheerna avastha*

Preparation of *Rasanjana*

Fig. 21: Soaking of *Daruharidra kwatha churna*

Fig. 22: *Kwatha* preparation

Fig. 23: Filtering *Kwatha*

Fig. 24: Adding *Ajaksheera* to *kwatha*

Fig. 25: Reduction in volume of *kwatha-ajaksheera* mixture

Fig. 26: *Rasanjana* obtained in leha consistency

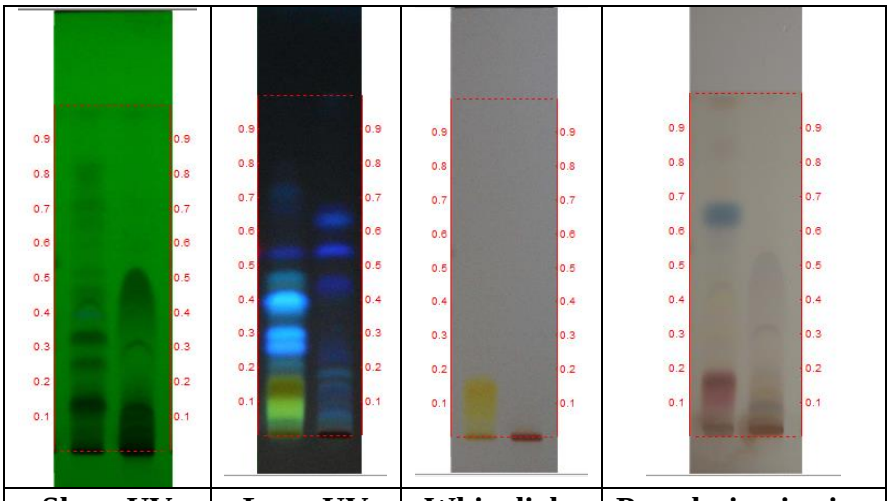
Fig. 27: *Rasanjana* obtained in granule form

Preparation of *Rakta Sthapana Churna*

Fig. 28: Individual ingredients

	
Fig. 29: Mixing	**Fig. 30. Packing**

Fig. 31: HPTLC photo documentation of ethanol extract of Rakta Sthapana Churna



Short UV	Long UV	White light	Post derivatisation

Track 2: Ethanol extract of *Rakta sthapana churna* – 5µl

Solvent system – Toluene: Ethyl acetate (9.0: 1.0)

DISCUSSION

Churnas of herbal ingredients: The dried drugs were separately taken and pounded manually in *ulukhala yantra* and further powdered using mixer grinder for better size reduction. The individual churnas were then filtered through a sieve to obtain uniform fine powder. The texture, hardness and other physical attributes of the drugs were observable during pounding. *Raktachandana* was exceedingly hard, and *Lodhra* was fibrous. *Sarjarasa* and *Shalmali niryasa* being resins, stick to the instruments while pounding due to their cohesiveness. *Sarjarasa* especially, formed a sticky aggregate when pounded or grinded continuously.

Even though all the churnas would be mixed at the end, preparing churnas of individual drugs separately is ideally necessary for several reasons.

- Standardization: By preparing individual churnas, each herb is processed consistently, contributing to overall uniformity of the final compound churna.
- Optimal Processing: Different herbs require different methods of processing, such as drying, grinding, crushing, triturating, etc. to convert them easily into churna form.
- Medicinal Integrity: Some herbs might be sensitive to certain processing methods or might degrade when mixed too soon. Preparing individual churnas allows us to maintain the medicinal integrity of each herb and avoid potential interactions or degradation.
- Dose Adjustments: When drugs are processed separately, we can adjust the quantity of each component as needed at any stage before the final formulation.
- Therapeutic Synergy: Some drugs might have synergistic effects when combined, but their individual qualities need to be examined well before using it in combination.
- Quality Control: By preparing individual churnas, quality control tests on each drug can be done if needed.
- Storage and Stability: Different drugs might have varying stability and shelf-life. By preparing the churnas separately, they can be stored separately and their overall deterioration can be avoided until the final formulation is compounded.
- Consistency: Combining separately prepared churnas ensures consistency in the final product. If the herbs are combined without individual processing, variations in particle size, moisture content, and other factors might lead to an inconsistent churna.

Gairika shodhana: For *shodhana* of *Gairika* various methods are described by different Acharyas, out of which *Godugdha bhavana* and *Goghrita bharjana* are the most followed.

The choice between these two methods depends on the intended therapeutic application, compatibility, and desired outcomes of the formulation. Here the *goghrita bharjana* method of *shodhana* was carried out. The heat applied during *Ghrita Bharjana* may remove moisture, volatile compounds, and certain impurities from *Gairika*. Additionally, the interaction between *Gairika* and ghee may impart certain beneficial qualities from *ghrita* such as *pittashamana* and *twachya* properties to *Gairika*. *Goghrita Bharjita Gairika* might have a longer shelf life whereas *godugdha bhavita Gairika* is susceptible to fungal growth when stored for longer durations.

***Kanji* preparation:** *Kanji* was prepared in accordance with the reference of Vaidika Paribhasha Pradipika. The *siddhi lakshanas*, including white colour, sour taste, strong odour, presence of bubbles/effervescence, and positive flame test, confirmed successful fermentation. Specific precautions were vital, including proper sterilization of the fermentation pot, thorough cooking, sealing the pot's lid, and maintaining a dark environment for controlled fermentation.

Shankha* and *Shukti shodhana: The *shodhana* process of *Shankha* and *Shukti* was carried out using the *Kanji*, as outlined in Rasatarangini reference. *Swedana* was conducted for 3 hours on a medium flame. The *shodhana* process led to significant changes in the appearance and properties of the *Shankha* and *Shukti*. Initially, *ashuddha shankha* was challenging to pound manually, while *ashuddha shukti* was brittle and easy to pound. The colour of *ashuddha shankha* was greyish white, while *ashuddha shukti* had a greyish white colour with a slight creamy shade. After shodhana, *shankha* transformed into a shiny, bright white state with slightly increased brittleness, whereas *shukti* became even brighter and more brittle than before.

Preparation of *Shankha Churna and Shukti churna*: Based on Acharya Adhamalla's Deepika commentary on *Romashatana Lepa*, from Sharangadhara Samhita Uttarakhanda where it is clarified that the term *Shankha churna* refers to *bharjita shankha churna*. This is applied here too considering it a general guideline for processing *shankha churna* for external applications. And as both *Shankha* and *Shukti*, being *Sudha varga dravyas* with similar *Shodhana* and *Marana* methods, both were subjected to *bharjana* to obtain *shankha churna* and *shukti churna*, respectively. During *bharjana*, both churnas reduced in volume, changed from shiny to pale, and became dry, greyish-white in texture. This study not only contributes to the understanding of formulation preparation but also showcases the importance of

commentary-based insights in Ayurvedic pharmaceutics. When *Shankha* and *Shukti churna* are roasted openly, several changes can occur due to the application of heat. The structural alterations and chemical reactions induced by *bharjana* can potentially enhance the bioavailability of active constituents within the churna allowing for easier absorption and interaction with the body. The possible changes in the *churna's* structure and composition due to *bharjana* can influence its therapeutic potency as well. All these concepts demand further study in this area to arrive at definitive conclusions.

Preparation of *Rasanjana:* In this procedure, *Daruharidra*, undergoes extraction within an aqueous medium. The resulting extract is then subjected to controlled evaporation, gradually concentrating its essence, and subsequently subjected to the addition of *Ajaksheera*, further followed by a phase of concentration until the entire mixture is evaporated, ultimately yielding the solid form of *Rasanjana.* The use of *Aja Ksheera*, with its unique characteristics pertaining to *Raktapitta shamana*, brings a complementary aspect to the formulation.

Preparation of *Rakta Sthapana Churna*: Following the general principle of *anuktadravya maana*, here the fine powder of each ingredient was individually prepared and then combined in equal quantities to obtain Rakta Sthapana Churna. Continuous and thorough mixing was essential to achieve a uniform, lump-free churna mixture. As the ingredients melded, a noticeable transformation unfolded in both the colour and fragrance of the blend. It was characterized by light brown colour and an aromatic amalgamation primarily influenced by the presence of *Rasanjana*, *Sarjarasa*, and *Godhuma.*

The evaluation of the organoleptic characteristics of *Rakta Sthapana Churna* brings to light the inherent uniqueness and therapeutic intentions of the formulation. It exhibited a light brown hue. The colour serves as an indicator of the different herbal and mineral constituents. *Rakta Sthapana Churna's* taste is characterized by *madhura*, *kashaya*, and *tikta rasa.* This amalgamation of tastes could potentially allude to its dual function—stopping blood flow while fostering tissue repair. The inclusion of *kashaya rasa*, associated with the attribute of *sthambhana*, along with the *guru guna* of madhura rasa, could synergistically contribute to the *rakta sthapana* or blood-stabilizing effect. It carries an aroma predominantly influenced by the presence of *Sarjarasa*, *Rasanjana* and *Godhuma.*

Rakta Sthapana Churna displayed a lower value of 6.07%, suggesting its drier nature. The total ash content was significantly higher at 25.56%. This signifies mineral content, denoting

the presence of *Gairika*, *Shankha* and *Shukti churna*. Analysing the acid insoluble ash and water-soluble ash, it showed values of 0.36% and 0.97% respectively. It had alcohol-soluble extractive value of 11.26% and water-soluble extractive value of 17.13%. This divergence might indicate *Rakta Sthapana Churna's* ability to release more water-soluble bioactive compounds.

High-Performance Thin Layer Chromatography (HPTLC)

In the HPTLC report, the Rf (Retention Factor) values of the sample from the ethanol extract of *Rakta Sthapana Churna* was measured under different conditions of UV light and post-derivatization. The values obtained for the samples under different conditions reveal distinct chromatographic patterns.

Rf value at short UV showed one spot at the Rf value of 0.48. **Rf value at long UV** exhibited 6 spots at the Rf values of 0.07, 0.15, 0.20, 0.45, 0.55 and 0.63. **Rf value at white light** did not exhibit any spots. **Post derivatization** revealed 4 spots at the Rf values of 0.09, 0.18 and 0.51. **Densitometric scan at 254nm** shows maximum area at Rf value 0.52 i.e., 71.65%. **Densitometric scan at 366nm** shows maximum area at Rf value 0.63 i.e., 32.60 %. **Densitometric scan at 620nm** shows maximum area at Rf value 0.03 i.e., 39%. The observed Rf values suggest the presence of distinct compounds with varying affinities for the stationary phase (silica gel) and the mobile phase (ethyl acetate-methanol). The variations in Rf values under different UV and light conditions highlight the presence of compounds with different polarities and molecular structures. The Rf values might correspond to the presence of active compounds with specific therapeutic activities.

CONCLUSION

From pharmaceutical study it can be concluded that the transformation of raw ingredients into fine powders involved the application of various principles of size reduction and size separation. The shodhana of *Gairika* done by *goghrita bharjana* method showcased the selection of pharmaceutical processing based on product stability and therapeutic requirements. The preparation of Kanji involves fermentation, with specific criteria such as positive flame test confirming successful fermentation. *Shankha churna* preparation by *bharjana* method showcased the importance of commentary-based insights in Ayurvedic pharmaceutics. *Rasanjana* preparation offered insight into the Rasakriya or ghana based processing techniques. The overall emphasis is on developing a fine blend of traditional principles with contemporary techniques along with the incorporation of Ayurvedic texts and

commentary-based insights in the field of pharmaceutical preparation, with a call for further research.

The analytical study offers valuable insights into the composition, properties, and interactions of individual components. HPTLC added another layer of understanding, revealing the presence of diverse compounds with varying affinities. Thus, the analytical study contributes to the standardization and quality control of the formulation and serves to enhance our understanding of its underlying pharmacological effects.

In summary, the pharmaceutical and analytical examination of Rakta Sthapana Churna establishes a foundation for future research and facilitates the integration of such formulations into Ayurvedic practice, thereby enriching both the scientific knowledge and healthcare applications.

Conflicts of interest: There are no conflicts of interest.

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