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Research Article

SIGNIFICANCE OF SHODHANA IN PREPARATION OF KASEESA DRAVAKA

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ABSTRACT

Introduction: Herbal and mineral preparations are essential in clinical practice worldwide, relying on classical techniques for purification. Shodhana (purification) is the first and fundamental step in purifying metals and minerals. This method eliminates impurities and enhances the material's properties, making them suitable for further refinement. Kaseesa Drava, a formulation described in the text Rasa Tarangini, which details its preparation and significance in traditional medicine. Kaseesa Dravaka is indicated in Guda Bhramsha (rectal prolapse) and is prepared by adding Shuddha Kaseesa (purified green vitriol) and distilled water in specified ratio. In the present article, the objective of the study is to understand the pharmaceutico-analytical changes in Kaseesa Dravaka based on the different methods of Shodhana of Kaseesa. Methods: The Shodhana of Kaseesa is performed using two distinct methods. According to Rasa Tarangini, Swedana is carried out in Bhringaraja (*Eclipta alba*) Swarasa, while Bhavana (levigation) with Nimbu (Lemon) Swarasa is prescribed in Brihat Rasa Raja Sundara. These purification techniques result in two different forms of Dravaka*:* each tailored to the specific method of Shodhana.Results: It is found that dravaka prepared out of Sweditha shuddha kaseesa has dark green semitransparent liquid with sedimentation and some floating particles. The Dravaka prepared out of Bhavitha shuddha kaseesa has light transparent liquid with some sedimentation. Analytically change in pH has been observed in both methods after dravaka prepared. Conclusion: Preparation of Kaseesa dravaka with two different methods of Shoditha kaseesa and change in its nature was observed.

Keywords: Kaseesa drava, Guda bhramsha, Swedana, Bhavana.

INTRODUCTION

Rasashastra is a field within Ayurvedic medicine that focuses specifically on the use of metals and minerals in pharmaceuticals. There are various types of formulations in Rasashastra, including solid and liquid dosage forms. Among the liquid dosage forms, Dravaka Kalpana stands out. This preparation involves both herbal and mineral ingredients and can be made either with or without the application of heat. It is designed for long-term preservation, administered in small doses, and can be used for both internal and external purposes.[1]

Kaseesa, an important drug in Rasashastra, is categorized under the Uparasa Varga.[2] It has several synonyms, including Pamshuka, Pamshukasisa, and Khaga[3] This green-colored iron mineral is chemically identified as *ferrous sulphate* ($FeSO_4 \cdot 7H_2O$). Therapeutically, it is utilized for a range of purposes, such as treating anemia, promoting hair growth, and skin disorders. [4]

Kaseesa Dravaka is a liquid dosage form detailed in classical Rasashastra texts, with absorption occurring through the skin and rectum through mucus membrane and transdermal layer.[5] It is specifically mentioned in Rasa Tarangini under the context of Upadhatwadivijnaneeya Taranga. This formulation consists of Shodhita Kaseesa and distilled water and is administered as basti in conditions like Guda Bhramsha.[6] Additionally, it is recommended for use in Dushta vrana (chronic wounds) due to the Vranaghna (wound-healing) properties of Kaseesa.[7]

The properties of a purified drug are influenced by the specific Shodhana method used during its purification. Different methods and media employed in the Shodhana process can result in variations in the drug's properties. This highlights the significance of selecting an appropriate purification technique to achieve the desired therapeutic qualities. Hence, the present study aims to explore the significance of various Shodhana methods employed in the preparation of Kaseesa Dravaka. This article highlights how different purification techniques impact the properties and therapeutic efficacy of the final formulation.

MATERIALS AND METHODS

Collection of Raw Materials

Raw materials required for Shodhana and Dravaka preparation of Kaseesa were procured from local market. Genuinity of the raw drugs were authenticated by Department of Rasashastra and Bhaishajya Kalpana and Department of Dravyaguna Vijnana.

Pharmaceutical Study

Steps Involved in Pharmaceutical Study

- Shodhana of Kaseesa in two different methods
- Preparation of Kaseesa dravaka

Table 1: Raw drugs required for Shodhana of Kaseesa and Kaseesa dravaka

Materials	Botanical / Chemical name	Total quantity taken
Ashuddha Kaseesa	Ferrous Sulphate ($FeSO_4$ 7H2O) [8]	100g
Bhringaraja Swarasa (method 1)	*Eclipta alba* (L). [9]	790ml
Nimbu Swarasa (method 2)	*Citrus limon* (L). [10]	15ml
Distilled water	Dihydrogen monoxide (H2O) [11]	Required quantity

Note: References 8-11 are listed in the main references list.

Table 2: Ingredients required in swedana procedure

Kaseesa in swedana method (weight)		Swarasa (volume)	Duration
Before	After	790ml	3 hours
50g	14g		

Note: g- grams, ml- milliliter.

Table 3: Ingredients required in bhavana procedure

Kaseesa in bhavana method (weight)		Swarasa (volume)	Duration
Before	After	15ml	8 hours
50g	43g		

Note: g- grams, ml- milliliter

Table 4: Requirements for Dravaka Preparation

	Kaseesa *Dravaka* (weight)	Distilled Water (volume)
Method 1	14g	672ml
Method 2	43g	2064ml

Note: g- grams, ml- milliliter

Shodhana and Dravaka preparation of Kaseesa were done in the practical laboratory, Department of Rasashastra and Bhaishajya Kalpana. (Table 1)

KASEESA SHODHANA IN TWO DIFFERENT METHODS

Method 1: The purification done using Swedana method for three hours mentioned in Rasa Tarangini (R.T). [12]
(Table 2)

Method 2: The purification done using Bhavana method for one day (8 hours) mentioned in Brihat Rasa Raja Sundara (B.R.S). [13]
(Table 3)

PREPARATION OF KASEESA DRAVAKA: [14, 15]

Materials Required: Distilled water, measuring jar, stirrer and airtight stopper bottle.

Procedure: Shuddha Kaseesa, purified using two distinct methods, was placed in a clean measuring jar. The appropriate quantity of distilled water was added to ensure precise measurement for consistency. The mixture was stirred thoroughly until the Kaseesa dispersed evenly, achieving a homogeneous solution. Once fully mixed, the liquid was carefully transferred into an airtight stopper bottle, secured properly for storage to maintain its stability and prevent contamination. (Table 4)

PHYSICOCHEMICAL STUDY

Physicochemical Analysis of Kaseesa dravaka in two methods

pH: [16]
The pH value measures acidic or alkaline of the solution. It is calculated using the formula **pH = -log [H_3O^+]**, which means it depends on the concentration of hydrogen ions in the solution. The pH scale ranges from 0 to 14. A solution with a pH of 7 is neutral, while a pH below 7 indicates acidity, and a pH above 7 indicates alkalinity. This scale helps to easily determine the chemical nature of a solution.

Specific Gravity: [17]
The specific gravity measurement is based on comparing the density of a liquid to that of water at a standard temperature. This helps determine the relative heaviness of the liquid without requiring absolute density values.

Procedure: The pycnometer method determines the specific gravity of a liquid by comparing its weight to that of an equal volume of water. First, the empty pycnometer is weighed, then filled with the liquid sample and weighed again. After cleaning and complete drying, it is refilled with distilled water at the same temperature and weighed again. The specific gravity is calculated by dividing the weight of the liquid by the weight of an equal volume of water.

Viscosity: [18]
The viscosity is based on fluid's resistance to flow due to internal friction of the liquid. This property determines how easily a liquid moves when subjected to force. Higher viscosity means greater resistance, while lower viscosity allows smoother flow.

Procedure: The capillary tube method measures viscosity by observing how a liquid flows through a narrow tube. The liquid is placed in a container and allowed to pass through the tube, while the time taken for it to flow is recorded. Viscosity is calculated using specific gravity of water and viscosity of water to that of specific liquid.

Refractive Index: [19]
Refractive index helps to determine the angle of refraction in the given sample of the drug.

Procedure: Placed a drop of water on the prism and adjusted the drive knob in such a way that the boundary line intersects the separatrix exactly at the center. Noted the reading. Distilled water has a refractive index of 1.33217 at 28 C. The difference between

the reading and 1.3320 gives the error of the instrument. If the reading is less than 1.3325, the error is minus (negative) then the correction is plus (positive) if the reading is more, the error is plus (positive), and the correction is minus (negative). The correction if any should be applied to the measured reading to get the accurate refractive index. The Refractive index of the test samples was measured at 28 C.

Table 5: Guna-Karma of drugs

Drug	Rasa	Guna	Virya	Vipaka	Karma	Rogagnatha
Kaseesa [20]	Kashaya, Amla	Guru, Grahi	Ushna	Katu	Mutrala, Balya, Keshya	Mutrakrichhra, Ashmari, Pandu.
Bhringaraja [21]	Katu, Tikta	Ruksha, Laghu	Ushna	Katu	Keshya, Tvachya, Netrya.	Shwasa, Kasa, Krimi.
Nimbu [22]	Amla	Guru, Tikshna	Ushna	Amla	Dipana, Pachana, Shotahara	Vibandha, Shoola, Chardi, Anaha.
Jala [23]	Avyakta rasa	Laghu	Sheeta	-	Pittahara, Tarpana, Hridya.	-

Note: References [21]- [24] are listed in main reference list.

Table 6: Observations during the preparation of Dravaka in different shodhana methods

Method 1 (swedana)	Method 2 (bhavana)
Kaseesa starts floating over water	Kaseesa completely sunken
After 5min parts of kaseesa gets dissolved	After 5min parts of kaseesa started dissolving
Change in color to dark Mehandi green	Change in color to pale yellow colour
Different colored bubbles appeared over the surface	No bubbles were seen
After 24 hours of constant keeping, the blackish ash colored liquid is formed with small quantity of sedimentation and little number of floating particles.	After 24 hours of constant keeping, the transparent yellowish liquid is formed with little amount of sedimentation.

Table 7: Results of pharmaceutical study

Sample	Ashuddha kaseesa (weight)	After shodhana (weight)	Loss after shodhana (weight)	Drug used (volume)	Distilled water (volume)
Method 1	50g	14g	36g	790ml	672ml
Method 2	50g	43g	7g	15ml	2064ml

Note: g- grams, ml- milliliter

Table 8: Organoleptic characteristics of Kaseesa Drava in two different shodhana methods

Parameters	Method 1	Method 2
Colour	Mehandi green	Pale yellow
Odour	Bringaraja gandha	Loha gandha
Taste	Tikta rasa	Amla rasa
Touch	-	-
Appearance	Liquid	Liquid

Table 9: Physicochemical analysis of Kaseesa *Drava*

	Method 1	Method 2
pH	5.90	2.55
Specific gravity	0.9968	0.9905
Viscosity	0.0270	0.0208
Refractive index	1.336	1.340

		
Raw kaseesa	**Nimbu swarasa**	**Bringaraja swarasa**

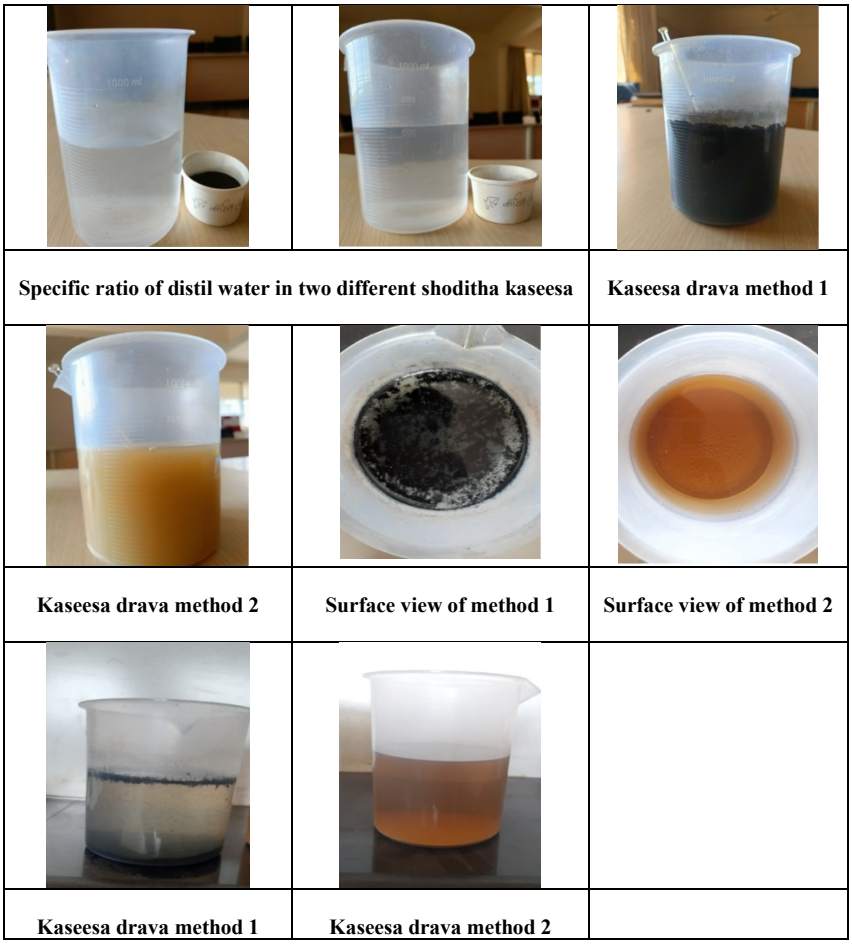

Figure 1: Preparation of *Kaseesa drava*

OBSERVATION AND RESULTS

Method 1: [24]

Procedure- 50g of kaseesa were pounded into smaller pieces and tied in small pottali made of cotton cloth. Fresh Bringaraja leaves were cut into pieces and squeezed to extract swarasa for the Swedana of Kaseesa using the Dola Yantra method. Approximately 900 ml of swarasa was obtained from 3 kg of bringaraja leaves. The juice was transferred to a stainless-steel vessel, and the pottali containing ashuddha kaseesa were suspended in the vessel using a rod, ensuring they were completely submerged in the bringaraja juice then it was boiled for three hours. After boiling, the pottali were removed, allowed to cool for easy handling, and the purified Kaseesa was carefully taken out, washed with warm water, and dried.

Method 2: [25]

Procedure- In a clean khalwa yantra, 50g of ashuddha kaseesa was finely ground into a powder. It was then subjected to bhavana (levigation) with nimbu swarasa (lemon juice) for one day (8 hours). Afterward, it was dried and stored in an airtight container.

DISCUSSION

Shodhana is an essential intermediary pharmaceutical process used for purification of metals and minerals during their conversion and usage into different dosage forms and purposes. There are different types of Shodhana mentioned according to different metals and minerals, such as bhavana, nirvapana, dalana, and swedana etc. In this study, two Shodhana methods—Bhavana and Swedana—are used. Swedana in Bhringaraja Swarasa and Bhavana with Nimbu Swarasa, but Bhavana is easier and simpler compared to Swedana, especially in terms of product recovery. Usage of distil water during the dravaka preparation because of its neutral pH, purity as well as effective solvent.

After shodhana of kaseesa, dravaka were prepared. While preparing the dravaka of kaseesa using two methods of shoditha kaseesa, the swedita kaseesa turns dark mehandi green colour, with different coloured bubbles with characteristic bringaraja odour and the liquid is semitransparent with little floating particles maybe because of bringaraja components in it. In bhavitha kaseesa colour changes to pale yellow with no bubbles, characteristic nimbu odour and liquid is transparent in nature with little sedimentation maybe because of iron constituents.

The pH of Kaseesa Dravaka helps determine whether the solution is acidic or basic. Generally, *ferrous sulfate* is acidic. When kaseesa was purified using Bhringaraja Swarasa, its pH became more basic compared to ashuddha kaseesa. This change could be due to the presence of particles from Bhringaraja Swarasa. On the other hand, Kaseesa purified with Nimbu Swarasa and citric acid was found to be acidic, likely because of the naturally acidic liquid medium. These observations suggest that the choice of purification medium directly influences the final pH of Kaseesa Dravaka. Other physicochemical analysis, such as specific gravity, viscosity, and TSS, were conducted to assess any changes in properties. The results showed slight variations in values. These observations suggest the usage of suitable method of shodhana procedure depends on condition to be indicated.

CONCLUSION

Kaseesa is ideally purified using a basic liquid medium, as suggested in Guda Bhramsha, considering the pH of the rectal region. This is achieved through Swedana, ensuring the effective removal of impurities while maintaining its desired chemical properties.

The process of Swedana facilitates controlled heating, allowing deeper interaction between the Kaseesa and the alkaline medium, leading to a more thorough purification. By optimizing the pH conditions, this method may help enhance the stability and therapeutic potential of the final product. Thus, selecting an appropriate purification medium plays a crucial role in refining the efficacy of Kaseesa Dravaka.

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