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A COMPARATIVE PHARMACEUTICAL EVALUATION OF VASAKASAVA PREPARED WITH DHATAKI PUSHPA AND BAKER'S YEAST AS FERMENTING AGENTS

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ABSTRACT

Sandhana Kalpana involves fermentation of Ayurvedic formulations with self-generated alcohol. Vasakasava is traditionally prepared using Dhataki Pushpa, while Baker's yeast (Saccharomyces cerevisiae) may serve as an alternative fermenting agent. Comparative pharmaceutical data are limited. To compare the pharmaceutical preparation of Vasakasava using Dhataki Pushpa and Baker's yeast as fermenting agents. Vasakasava was prepared following the classical reference of Yogaratnakara. The formulation was prepared through Purva Karma, Pradhana Karma, and Paschat Karma. The prepared mixture was divided into two samples: Sample 1 with Dhataki Pushpa (200 g) and Sample 2 with Baker's yeast (50 g). Fermentation was monitored for 30 days based on organoleptic changes, effervescence, hissing sound, lime-water test, and candle test, followed by filtration and maturation. Fermentation started on day 5 in Sample 1 and day 7 in Sample 2. Both samples completed fermentation by day 30. Sample 1 yielded 3.5 kg and Sample 2 yielded 4.02 kg after maturation. Differences were observed in fermentation onset, odour, effervescence, and pellicle formation. Both methods successfully produced Vasakasava with comparable pharmaceutical characteristics. Dhataki Pushpa showed earlier fermentation initiation, while both samples completed fermentation successfully.

INTRODUCTION

Sandhana Kalpna is process of ornamentation of drugs with fermentation to alcohol[1].Among the Sandhana Kalpana, Asava and Arishta constitute an important group of fermented Ayurvedic formulations[2]. Traditionally, they are prepared by fermenting herbal decoctions or fresh juices with jaggery, sugar, or honey. In this process, self-generated ethyl alcohol is produced by in-source material used in pharmaceutical procedure, and is not added from outside. The alcohol produced helps in extracting the active constituents of the herbal drugs, thereby improving their extraction and availability in the formulation. Thus, these formulations have longer shelf life, quick absorption and action and excellent therapeutic efficacy as compared to other Ayurvedic herbal medicines[3].

Vasakasava is a classical Ayurvedic fermented formulation traditionally prepared using Dhataki Pushpa as the fermenting agent. With advancements in pharmaceutical practices, Baker's yeast (Saccharomyces cerevisiae) may serve as an alternative fermenting agent due to its defined and reproducible Fermentation characteristics. Saccharomyces cerevisiae (Baker's yeast) directly ferment the sugar molecule into alcohol[4].

Comparative pharmaceutical data on Vasakasava prepared with Dhataki Pushpa and Baker's yeast are limited. Differences in fermenting agents may influence the Fermentation process, duration, yield, organoleptic characteristics, and physicochemical parameters. Hence, the present study was undertaken to comparatively evaluate Vasakasava prepared using these two fermenting agents.

AIM AND OBJECTIVES

1. To study the pharmaceutical preparation of Vasakasava from Classical reference (Yogaratnakara).
2. Comparative pharmaceutical preparation of Vasakasava Prepared with Dhataki Pushpa and Baker's Yeast as Fermenting Agents

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MATERIALS AND METHOD

The pharmaceutical preparation of Vasakasava was systematically carried out in three sequential stages.

A. Purva Karma – Preliminary Preparations
Step 1 : Collection and Authentication of Raw Drugs
Step 2 : Cleansing of Raw Drugs
Step 3 : Preparation of Prakṣepa Dravya Churṇa
Step 4 : Selection of Vessels (Sandhana parta)
Step 5 : Dhupana and Lepana of Sandhana Patra
Step 6 : Preparation of Fermentation Site
Step 7 : Preparation of Vasakwatha

B. Pradhana Karma – Main Pharmaceutical Procedure
Step 8 : Addition of Madhuradravya, and Prakshepadravya in Vasakwatha
Step 9 : Mixing of Sandhana dravya (Divide into two Vasakasava Sample)
Step 10 : Filling, sealing and placing of Sandhana patra
Step 11 : Sandhibandhana (Kapadmitti) of Sandhana patra
Step 12 : Observation at different stages of Fermentation

C. Paschat Karma – Post-Fermentation Processing
Step 13 : Filtration and Maturation of Vasakasava
Step 14 : Storage, Packing and labeling of Vasakasava

A. Purva karma

- **Step 1 : Collection and Authentication of Raw Drugs**

Vasa Panchanga was collected from the herbal garden and campus of Gopabandhu Ayurveda Mahavidyalaya, Puri, Odisha. Other raw materials were collected from the local drug market, while Baker's yeast was procured from a local bakery of Kolhapur, Maharashtra. All herbal raw materials were authenticated by experts from the Departments of Dravyaguna and Rasashastra of the institution to ensure their identity, genuineness, and purity.

Table 1 : Ingredients required for Vasakasava preparation[5]

Ingredients	Name	Latin name	Part used	Amount
Kwatha dravya	Vasa	Adhatoda vasica	Panchanga	5 kg
Prakshepa dravya	Dalachini	Cinnamomum zeylanicum	Stem Bark	25 gm
	Ela	Elettaria cardemomum	Seed	25 gm
	Tamalapatra	Cinnamomum tamala	Leaves	25 gm
	Nagakesara	Mesua ferrea	Flower	25 gm
	Sunthi	Zinziber officinale	Rhizome	25 gm
	Maricha	Piper nigrum	Fruit	25 gm
	Pippali	Piper longum	Fruit	25 gm
	Sugandhabala	Pavonia odorata	Root	25 gm
	Kankola	Piper cubeba	Fruit	25 gm
Madhura dravya	Guda	-	-	2.5 kg
Sandhan dravya	Dhatakipuspa	Woodfordia fruticosa	Flower	200 gm
	Baker's Yeast	Saccharomyces cerevisiae	-	50 gm
Sneha dravya	Ghrita	-	-	200 gm
Dhupana dravya	Tamalpatra	Cinnamomum tamala	Leaves	20 gm
	Karpura	Cinnamomum camphora	Niryasa	20 gm
	Lavanga	Syzygium aromaticum	Flower bud	20 gm
	Dalachini	Cinnamomum zeylanicum	Stem bark	20 gm
	Guggulu	Commiphora mukul	Resin	20 gm

- **Step 2 : Cleansing of Raw Drugs**

Vasa Panchanga was cut into small pieces and thoroughly washed with water. The Prakshepa Dravyas were carefully inspected and cleaned to remove any extraneous materials and then exposed to sunlight for a short period to facilitate drying and removal of extra water.

1. **Step 3 : Preparation of Prakṣepa Dravya Churṇa**

All the Prakshepa Dravyas were individually pounded using an Ulukhal Yantra to prepare coarse powder & kept in trays for further use.

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2. **Step 4 : Selection of Vessels**


Handi


Sandhan patra


Maturation jar


Collection jar


Packing bottels

Table 2 : Vessels required for Vasakasava preparation

Use	Vessels
For Kwatha preparation	Handi
For Fermentation process	2 earthen pot with lid (Each 10 L capacity)
For maturation process	2 glass jar with loose lid
For storage	2 glass jar with airtight lid (Each 3 L capacity)
For packing	Leakage proof Plastic bottle (Each 200ml capacity)

3. **Step 5 : Dhupana and Lepana of Sandhana Patra**

Both Sandhana Patras and their lids were thoroughly washed with water and dried under sunlight before use.

The Angara Koṣṭhi was first ignited, and the Dhupana Dravyas were placed over the burning embers. Once adequate fumes was generated, the earthen Sandhana Patras were inverted over the Angara Koṣṭhi for 2–3 minutes, using a cloth for safe handling, allowing the fumes to enter and permeate the vessel. The vessel was then removed and immediately covered with its lid to retain the fumes for 10 minutes, thereby facilitating Dhupana and internal fumigation of the vessel.

After cooling, the inner surfaces of the earthen pot and its lid were uniformly smeared with ghee using a cotton pad (Pichu) and let it to dry inside.

4. **Step 6 : Preparation of Fermentation Site**

A dark, enclosed (Nirvata) room with minimal temperature variation and protection from direct sunlight and air currents was selected for Sandhana Kalpana**.** For Sample 1, a square-shaped area was prepared and lined with husk at the base. For Sample 2**,** a pit corresponding to the shape of the Sandhana Patra was prepared and similarly filled with husk.

5. **Step 7 : Preparation of Vasakwatha**

Material Required

- Vasapanchanga - 5kg
- Water – 40 L

Equipment : Handi, Weighing machine, cotton cloth, ladle, bucket

Procedure

Vasa Panchanga (5kg) was wash thoroughly and cut into small pieces and added to 40 L of water in a stainless-steel vessel. The mixture was subjected to mild heat (Mridu Agni) until reduced to one-fourth (¼) of the initial volume. The prepared Kwatha was filtered through a two-folded cotton cloth and collected in a separate vessel (bucket).

Observation

Yellowish frothing was observed on the surface of the Kwatha, accompanied by the characteristic aroma of Vasa during the preparation.

Result

Quantity of Kwatha Obtained : 12.484 kg

B. Pradhana Karma – Main Pharmaceutical Procedure

6. **Step 8 : Addition of Madhuradravya, and Prakshepadravya in Vasakwatha**

Addition of Madhuradravya:

2.5 kg of Guda(jaggery) was broken into small pieces and added to the hot Vasa Kwatha. The mixture was stirred thoroughly until the Guda was completely dissolved and uniformly mixed. It was then filtered through a single-folded cotton cloth to remove any extraneous matter and impurities of guda.

Addition of Prakshepadravya:

On the following day, after the Vasa Kwatha had cooled completely to room temperature, the previously prepared Prakshepa Dravya Churna was added individually and mixed thoroughly.

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7. Step 9 : Mixing of Sandhana dravya (Divide into two Vasakasava Sample)

The prepared herbal mixture was divided equally into two clean, dry Fermentation vessels and labelled as Sample 1 and Sample 2. Dhataki Pushpa was added as the Sandhana Dravya to Sample 1, while Baker's yeast was added as the Sandhana Dravya to Sample 2.

Table 3 : Sampling of Vasakasava

Vasakasava	Sandhana Dravya
Sample 1	Dhataki Pushpa
Sample 2	Baker's Yeast

8. Step 10 : Filling, sealing and placing of Sandhana patra

The prepared mixtures of Sample 1 and Sample 2 were transferred separately into the previously prepared Sandhana Patra (earthen pots) and labelled accordingly. The respective lids were securely placed over the pots.

Both Sandhana Patra were then positioned at their designated locations within the previously prepared Fermentation site in a dark room. Sample 1 was placed in the prepared square area, whereas Sample 2 was placed in the prepared earthen pit.

A clean cloth towel was wrapped around the mouth of each Sandhana Patra and secured over the lid until Kapadmitti was applied, to prevent the entry of foreign matter during placement at the Fermentation site. Husk was placed around the vessels and over the lids to provide insulation and maintain suitable conditions for Fermentation.

9. Step 11 : Sandhibandhana (Kapadmitti) of Sandhana patra

Before applying Kapadmitti, a small hole was carefully made in the lid of each Sandhana Patra using a drilling machine. A transparent tube (2 ft) was inserted through the hole, with one end extending into the vessel to provide a passage for the evolved gases for perform the lime-water test. The other end of the tube was tightly closed with a clip to prevent the entry of external air and foreign matter, thereby maintaining a closed anaerobic environment for Fermentation. The initiation of Fermentation was assessed by observations which is described in below step 12.

Table 4 : Time taken for Initiation of Fermentation

Initiation of Fermentation	Time taken
In Sample 1(Dhatakipushpa)	5 days
In Sample 2 (Baker's Yeast)	7 days

Thereafter, on 6th and 8th day Kapadmitti was applied on Sample 1 and Sample 2 respectively at the junction between the lid and the mouth of each Sandhana Patra to ensure proper sealing.

After Sandhibandhana, the Vasakasava preparations were kept undisturbed for 30 days to allow completion of the Fermentation process.

During the Fermentation period (30 days), the Samples were regularly monitored and observed for changes indicative of Fermentation progress.

10. Step 12 : Observation at different stages of Fermentation process

Under the present study, the following organoleptic parameters were observed: Shabda (sound), Rupa (appearance), Rasa (taste), and Gandha (odour).

Table 5 : Organoleptic parameters of Fermentation process

Pariksha	Organoleptic parameters
Shabda	Hissing sound, Effervescence
Rupa	Colour, Pellicle layer(Fungus layer),Prakshepa Dravya level,Burning candle test,Lime water test
Rasa	Taste
Gandha	Odour

Table 6 : Stages of Fermentation process

Satge of Observation	Time of Observation
Before initiation of Fermentation	On Day 01
After initiation of Fermentation	On Day 06 for Vasakasava Sample 1
	On Day 07 for Vasakasava Sample 2
During process of Fermentation	On Day 08,11,14,17,25 (After initiation of Fermentation)
After completion of Fermentation[6]	On Day 30 (After initiation of Fermentation)

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Table 7: Observation at Before and after initiation of Fermentation

Observation	Before initiation of Fermentation of Vasakasava	After initiation of Fermentation of Vasakasava	
		Sample 1 (Dhatakipushpa)	Sample 2 (Baker's Yeast)
Alcoholic odour	Absent	Mild	Relatively less than Sample 1
Prakshepa dravya	Floats	Floats	Floats
Effervescence	Absent	Present	Less pronounced than Sample 1
Hissing sound	Absent	Present	Less pronounced than Sample 1
Burning candle test	Continues to burn (+ve)	Put off(-ve)	Weakening of the flame(-ve)

Table 8: Observation During process of Fermentation

Observation	Time	Vasakasava Sample 1	Vasakasava Sample 2
Hissing sound	On Day 08,11,14,17,25	Present	Less pronounced than Sample 1
Lime water test	On Day 14 and 25	+ve (milky white)	+ve (milky white)
Burning candle test	On Day 14 and 25	-ve (put off)	-ve (Weakening)

Table 9: Observation After completion of Fermentation (Before opening lid of pot)

Observation	Vasakasava Sample 1	Vasakasava Sample 2
Hissing sound	Absent	Absent
Lime water test	Remains clear (-ve)	Remains clear (-ve)
Burning candle test	Continues to burn(+ve)	Continues to burn(+ve)

Table 10: Observation After completion of Fermentation (After opening lid of pot)

Observation	Vasakasava Sample 1	Vasakasava Sample 2
Pellicle layer(Fungus layer)	Present (Thick layer)	Present (Thin film layer)
Odour	Strong sour-sweet characteristic fragrance with Vasa odour	Relatively less than Sample 1
Taste	Sour, sweet, and slightly bitter	Bitter, sweet, sour
Effervescence	Absent	Absent
Prakshepa dravya	Settle down	Settle down
Burning candle test	Continues to burn(+ve)	Continues to burn(+ve)

Effervescence: Effervescence was assessed by observing bubbles, foaming, and movement of the liquid surface, along with listening for the faint hissing or sizzling sound produced by the evolution of CO_2.

Hissing sound: The hissing sound was monitored using a stethoscope placed on the outer surface of the Sandhana Patra. Effervescence and hissing sound at the initiation of Fermentation occurs due to the rapid conversion of fermentable sugars into ethanol and carbon dioxide (CO_2) by microorganisms. The evolved CO_2 escapes as bubbles, producing characteristic fizzing or foaming.

Burning candle test: A lit candle was brought near the surface of the liquid inside the Sandhana Patra after briefly opening the outlet. Weakening or extinguishing of the flame indicated the presence of CO_2 generated during Fermentation, confirming active Fermentation (test -ve). Due to absence of CO_2 at completion of Fermentation, the burning candle continue to burn (test +ve).

Lime water test : The lime-water test was used to monitor the progress of Fermentation without opening the Fermentation pot. The clamp was removed from the outer end of the transparent tube, and the tube was immediately dipped into a test tube containing lime water. During active Fermentation, the CO_2 produced passed through the tube and turned the lime water milky, indicating a positive test(+ve). When no milky change was observed, the test was considered negative(-ve), indicating the absence of detectable CO_2 production and suggesting completion of Fermentation.

Pellicle layer (Fungus cell layer) : A pellicle may form due to the accumulation and growth of microorganisms at the liquid–air interface. Oxygen exposure and microbial extracellular substances can contribute to the formation of this surface film.

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C. Paschat Karma – Post Fermentation Processing

Step 13 : Filtration and Maturation of Vasakasava

Filtration : After completion of Fermentation, both Sandhana Patra were removed from the Fermentation site. The contents of each vessel were thoroughly mixed using a clean ladle and filtered separately through a double-layered cotton cloth into clean vessels to remove suspended and coarse particulate matter.

Maturation : The prepared Vasakasava was kept for 15 days for maturation and monitored periodically. Both Samples were transferred into clean glass jars, which were kept in a stable, even, and undisturbed place. The jars were covered without an airtight seal to allow maturation under suitable conditions.

Observation: After completion of maturation, A thin white surface film in Vasakasava Sample 1 only, possibly associated with aerobic microbial activity and fine suspended particles settled at the bottom of the both jars.

D. Step 14 : Storage, Packing and labeling of Vasakasava

Storage : After maturation, the glass jars were kept undisturbed, and the superficial film was carefully removed using a clean stainless-steel spoon. A clean transparent tube(3ft) was inserted without touching the bottom or disturbing the settled material. Vasakasava was transferred into a clean collection vessel by creating negative pressure at the outer end of the tube, leaving the settled material undisturbed. The preparation was slowly filtered through a double-layered cotton cloth fitted over a strainer to obtain the clear Vasakasava.

Here,the collected preparations of both samples were stored separately in individual 3 L capacity glass jars with airtight covers, leaving approximately one-third of the jar as headspace.

Packing and labeling : The prepared samples were packed separately in 200 mL leak-proof plastic bottles, properly labelled, and sent for analytical evaluation and further use

RESULT

Table 11 : Chronological Record (1) of Pharmaceutical Preparation

Process	Vasakasava Sample 1	Vasakasava Sample 2
Collection of Raw Drug	01/04/26	01/04/26
Date of Commencement	06/04/26	06/04/26
Formulation Starting Date (Kwatha preparation)	06/04/26	06/04/26
Date of Placing Sandhana	07/04/26	07/04/26
Fermentation initiation after placing Sandhana	13/04/26	15/04/26
Fermentation completion & Filteration	13/05/26	15/05/26
Maturation completion & Storage	29/05/26	31/05/26
Date of Completion	29/05/26	01/06/26
Total time duration for Fermentation	30 days	30 days
Total Duration of the Pharmaceutical Process (Kwatha preparation to Storage)	52 days	54 days

Table 12 : Chronological Record (2) of Pharmaceutical Preparation

Process	Vasakasava Sample 1	Vasakasava Sample 2
At time of Placing Sandhana for Sandhana	6.23 kg	6.25 kg
After Filtration	3.8 kg	4.04 kg
After Maturation	3.5kg	4.02 kg
Total Loss	2.73 kg	2.23 kg

- Both samples showed comparable pharmaceutical characteristics throughout the process. Before fermentation, both were brown in colour, with a strong Vasa odour and bitter-astringent taste.
- Fermentation initiated on the 5th day in Sample 1 and 7th day in Sample 2, with froth formation, bubbling, and mild alcoholic odour.
- Prakshepa Dravyas initially floated and gradually settled as fermentation progressed on both the samples.
- The liquid became clearer and darker, with a more pronounced alcoholic odour.
- Fermentation was completed on the 30th day in both samples, marked by cessation of bubbling and hissing sounds and complete settling of Prakshepa Dravyas.

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Comparative pharmaceutical observations are presented in Table 9,10,11.



DISCUSSION

Here, the preparation was performed to compare the classical and modified methods. Sandhana Dravya was added after the Kwatha cooled to Sheeta Avastha. Acharya Vagbhata described Dhataki as a Sandhana Dravya[7]. Saccharomyces cerevisiae provides efficient and reliable fermentation. Prakshepa Dravyas were used as coarse powder to reduce sedimentation. One-fourth of the vessel was kept empty for gas accumulation. Husk insulation helped maintain a suitable fermentation temperature. Here Dhoopana karma, Reduces microbial contamination and fumigates the vessel[8] while Lepana karma, Coats and seals the inner surface, reducing porosity, prevent entry of oxygen into patra, maintenance of temperature[9] and liquid seepage and preparing the vessel for Fermentation. This sequence therefore provides initial decontamination followed by surface sealing, making the Sandhana Patra suitable for Fermentation.

A clean, dark, and protected environment supported fermentation. Traditionally, methods such as Dhanya Rashi and Bhugarbha[10] placement were employed to maintain a suitable fermentation environment by providing thermal insulation and protection from light and air. Based on this principle, two separate Fermentation sites were prepared within the same room for the two Vasakasava Samples.

During maturation period, the preparation was kept undisturbed to allow fine suspended particles to settle, improve clarity, and develop stable taste and odour. It also helped the fermented preparation to become more stable before final storage and allows any residual Fermentation to reach completion. Fermentation was faster in warmer conditions(summer) and slower during winter.

CONCLUSION

Vasakasava was prepared by two methods with Dhataki Pushpa (classical method) and Baker's Yeast method. Both samples were prepared with following Ayurvedic Sandhana Kalpana guidelines. Hygienic conditions, proper proportions, suitable fermenting agents, and controlled temperature were maintained. Both samples completed fermentation successfully without contamination. Differences in fermentation behaviour were observed as shown in the above tables. The Dhataki Pushpa-based sample showed earlier onset of fermentation. Both samples developed a stable alcoholic aroma and characteristic dark-brown colour.

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