ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 12| Issue: 1| January2026|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2025: 8.691 || ISI Value: 1.188

PHARMACEUTICAL STANDARDIZATION AND ANALYTICAL EVALUATION OF SAMBUKADI VATI

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ABSTRACT

Sambukadi Vati is a traditional Ayurvedic formulation mentioned in Bhaisajya ratnavali undr Grahani roga adhikara indicated in Vataja Grahani. This investigation was undertaken to establish pharmaceutical reproducibility and analytical acceptability of Sambukadi Vati through validation of traditional processing techniques i.e. Shodhana and Marana of Sambuka (apple snail shell) and to establish a Standard Operating Procedure (SOP) for the preparation of Sambukadi Vati using contemporary analytical parameters.

KEYWORDS: *Sambukadi Vati, Sambuka Bhasma, Shodhana, Marana, Pharmaceutical standardization, Analytical evaluation*

INTRODUCTION

Ayurveda approaches disease management through an integrated understanding of causative factors (Hetu), clinical manifestations (Linga), and therapeutic interventions (Aushadha) Among these, Aushadha plays a pivotal role; however, many raw mineral and animal-origin substances are unsuitable for direct administration due to their inherent hardness, toxicity, and poor bioavailability.

Classical pharmaceutical processing described under Bhaishajya Kalpana plays a critical role in converting raw natural substances into therapeutically acceptable dosage. Compound formulations are preferred due to their synergistic and multi-targeted actions. Sambukadi Vati is a classical formulation wherein Sambuka is processed into Bhasma form to enhance safety and efficacy. The present study focuses on pharmaceutical standardization and analytical characterization of Sambukadi Vati to ensure quality, safety, and reproducibility.

AIMS AND OBJECTIVES

1. To prepare Sambukadi Vati according to classical Ayurvedic principles.
2. To validate the Shodhana and Marana processes of Sambuka.
3. To document pharmaceutical observations and yield at each stage.
4. To establish analytical standards for quality, purity, and stability.

MATERIALS AND METHODS

Pharmaceutical Materials

Ashuddha Sambuka, Saindhava Lavana, Nimbu, alovera and honey were procured from authenticated sources and identified by subject experts in Dravyaguna and Rasashastra. Pharmaceutical work was carried out in the Mini Pharmacy Unit, PG Department of RS & BK, Gopabandhu Ayurveda Mahavidyalaya, Puri.

Analytical Evaluation

Analytical testing was conducted at the Quality Control Laboratory, ALN Rao Memorial Ayurvedic Medical College and PG Centre, Koppa, Karnataka, following CCRAS and Ministry of AYUSH protocols.

PHARMACEUTICAL STUDY

Materials and Methods: Sambuka was purified by Swedana in Nimbu Swarasa and subjected to Putapaka Marana through five incineration cycles at controlled temperature. Sambukadi Vati was prepared using Sambuka Bhasma, Saindhava Lavana, and honey. The finished formulation was evaluated through organoleptic and physico-chemical analysis as per CCRAS and Ministry of AYUSH guidelines.

1.Shodhana

The first step in transforming raw Sambuka (conch shell) into medicine is Shodhana (purification), which removes physical and chemical impurities.

Objective: To obtain Suddha (pure) Sambuka from raw materials.

Method (Swedana): 500g of raw Sambuka was washed, crushed into small pieces, and boiled in Nimbu Swarasa (fresh lemon juice).

Duration: The process was carried out for 1.5 hours (Yamardha).

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Observations

Sl No. Parameter Before Shodhana After Shodhana
1.Weight 500g 458g (8.4% weight loss)
2. Colour Brown with yellowish luster Dull brownish and lusterless
3. Texture Smooth and shiny Rough
4. Lemon Juice Clear, pale yellow Turbid, reddish yellow

The acidic medium of Nimbu Swarasa facilitated surface modification and removal of extraneous material, as reflected by weight reduction and textural changes.

Precautions

Complete Immersion: The Asodhita Sambukas must be completely submerged in the Nimbu Swarasa throughout the process.

Regular Stirring: The material should be stirred at regular intervals to ensure uniform exposure and consistent contact with the lemon juice.

Heat Control: The entire Swedana process must be carried out over a moderate flame.

2. Marana: Transformation into Sambuka Bhasma

To make the mineral bioavailable, it must undergo Marana (incineration) to become a fine Bhasma.

Bhavana (Levigation): Purified Sambuka was triturated with Kumari Swarasa (Aloe vera juice) until it reached a dough-like consistency.

Puta (Incineration): The material was formed into pellets (Chakrikas), dried, and subjected to five Puta cycles in a muffle furnace. Heating was reached temperatures up to at 450°C for 3 hours during the final cycle to ensure complete chemical transformation.

Quality Indicators: The obtained Bhasma of 150gms was fine, whitish-grey, and fulfilled classical tests such as including Rekhapurnatva (entering the furrows of the finger), Varitaratva (floating on water) and unnama, indicating a nano-microcrystalline structure ready for absorption. Repeated incineration ensures particle size reduction and physicochemical transformation, rendering the material suitable for internal administration.

Bhasma Parikshya

Varitara

Unnama

Rekhapurnata

Precautions during Marana of Sambuka

1. Only properly Shodhita Sambuka should be used.
2. Uniform Bhavana with fresh Kumari Swarasa; avoid excess liquid.
3. Chakrikas should be uniform and completely shade-dried before Puta.
4. Well-sealed, crack-free Sharava Samputa must be used.
5. Controlled temperature and duration of Puta should be strictly maintained.
6. Natural self-cooling (Swangasheeta) is essential; forced cooling must be avoided.

3. Vati Nirmana

Ingredients

1. Sambuka Bhasma Primary active mineral base 100g
2. Saindhava Lavana 100g
3. Honey (Kshaudra) As required

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Sambuka Bhasma

Saindhava Lavana

Honey

Preparation Process

Trituration: The Bhasma and Saindhava Lavana were mixed and triturated with water and honey to form a cohesive mass. Saindhava Lavana acts as a Yogavahi, while honey serves as a natural binder and improves pharmaceutical acceptability.

Molding: The mass was manually rolled into tablets (250–500 mg).

Drying: The tablets were shade-dried to maintain stability and prevent the degradation of heat-sensitive components.

Observations

- Uniform mixing produced a smooth, cohesive mass.
- Saindhava Lavana acted as a natural binder.
- Vatis formed were uniform, smooth, and non-friable after drying.

Precautions

- Ingredients should be finely powdered and uniformly triturated.
- Excess water must be avoided.
- Vatis should be shade-dried and stored in airtight containers.

PHARMACEUTICAL PROCEDURE

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ANALYTICAL STUDY

The present study involves the physico-chemical evaluation of Sambuka Bhasma and Sambukadi Vati, conducted at ALN Rao Memorial Ayurvedic Medical College and PG Centre, Koppa, Karnataka. All analyses were performed in accordance with CCRAS guidelines prescribed by the Ministry of AYUSH, Government of India.

EVALUATION PARAMETERS

1. Organoleptic Evaluation

Assessment based on sensory perception to preliminarily evaluate identity and quality.

- Rupa (Colour)
- Rasa (Taste)
- Gandha (Odour)
- Sparsha (Texture/Consistency)

Special tests for Sambuka Bhasma:

- Rekhapurnata
- Varitarata
- Unnatva
- Absence of taste and odour

2. Physico-Chemical Evaluation

Objective parameters for standardization and quality assurance:

- Loss on drying
- Total ash
- Acid-insoluble ash
- Water-soluble ash
- Alcohol-soluble extractive
- Water-soluble extractive
- pH
- Preliminary phytochemical screening
- Fluorescence analysis
- Tablet parameters (uniformity, friability, hardness, disintegration time)
- Thin Layer Chromatography (TLC)

3. Biological Evaluation

Microbial contamination (total bacterial count, yeast and moulds, E. coli, Salmonella)

A. Organoleptic Characters

	Sambuka Bhasma	Sambukadi Vati
Colour	Off white	Off white
Odour	-	Characteristic
Taste	-	Bitter, astringent
Texture	Powder	Vati
Rekhapurnata	+	-
Varitarata	+	-
Unnatva	+	-

B. Physico-Chemical Parameters

	Sambuka Bhasma	Sambukadi Vati
Loss on Drying at 105°C	0.41 %	0.78%
Total ash	91.21 %	71.11%
Acid insoluble ash	73.27 %	28.75%
Water soluble ash	97.67 %	52.70%
Alcohol soluble extractives	3.81 %	5.26%
Water soluble extractives	6.72 %	8.72%
pH (5% aqueous solution)	11.01 ± 0.10	11.42 ± 0.10

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C. Preliminary Phytochemical Tests (Qualitative Tests)

	Sambuka Bhasma	Sambukadi Vati
Carbohydrate	Absent	Absent
Protein	Absent	Absent
Alkaloid	Absent	Present
Cardiac glycoside	Absent	Absent
Flavonoids	Absent	Present
Tannins	Present Absent	Present Absent
Antraquinone glycoside	Absent	Absent
Triterpenoides		

C. Fluorescent Tests

Sambuka Bhasma	Under Visible Light	Under Long UV
Sample + Water	Light grey	Fluorescent green
Sample + MeOH	Creamish white	Fluorescent yellow
Sample + 10% NaOH	Creamish grey	Fluorescent yellow
Sample + 10% HCl	Light grey	Fluorescent green
Sample + 10% HNO_3	Creamish grey	Fluorescent green
Sample + 10% H_2SO_4	Slightly creamish	Fluorescent yellow
Sample + 10% NH_3	Grey	Brown
Sambukadi Vati	Under Visible Light	Under Long UV
Sample + Water	Light grey	Fluorescent green
Sample + MeOH	Creamish white	Fluorescent yellow
Sample + 10% NaOH	Creamish grey	Fluorescent yellow
Sample + 10% HCl	Light grey	Fluorescent green
Sample + 10% HNO_3	Creamish grey	Fluorescent yellow
Sample + 10% H_2SO_4	Slightly creamish	Fluorescent yellow
Sample + 10% NH_3	Grey	Brown

D. Quantitative Estimation

	Sambuka Bhasma	Sambukadi Vati
Calcium	39.65%	40.07%
Magnesium	3.68%	3.92%
Potassium	0.21%	0.20%

E. Tablet Parameters for Sambukadi Vati Uniformity test (in mg) : 1.100 ± 6.25
Friability test (loss percentage) : 0.43%
Hardness test (kg/cm^3) : 4.50
Disintegration time (minutes) : 5 minutes

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F. Thin Layer Chromatography

Solvent System: Toluene: Ethyl acetate: Formic acid:: 10:8:2

Under Long UV

Rf Values	**Sambuka Bhasma**	**Sambukadi Vati**
0.06	Fluorescent green	Fluorescent green
0.13	Fluorescent blue	Fluorescent blue
0.19	Fluorescent blue	Fluorescent blue
0.59	Blue	Blue
0.75	Blue	Blue

G. Microbial Contamination

	Sambuka Bhasma	**Sambukadi Vati**
Total aerobic count	Nil	Nil
Total fungal count	Nil	Nil

DISCUSSION

The study demonstrates that classical Ayurvedic pharmaceutical procedures, when executed under controlled conditions, produce a standardized and analytically acceptable formulation in which Sambuka was purified by Swedana in Nimbu Swarasa and subjected to Putapaka Marana through five incineration cycles at controlled temperature. Shodhana effectively reduced impurities and hardness of Sambuka, while Marana ensured conversion into a fine, bioavailable Bhasma. Sambukadi Vati was prepared using Sambuka Bhasma, Saindhava Lavana, and honey. The finished formulation was evaluated through organoleptic and physico-chemical analysis as per CCRAS and Ministry of AYUSH guidelines.

CONCLUSION

The present pharmaceutical and analytical investigation successfully established a Standard Operating Procedure for Sambukadi Vati. Classical processes of Shodhana and Marana were validated through modern analytical parameters, confirming the quality, stability, and safety of the formulation. The standardized Sambukadi Vati is suitable for clinical application, particularly in the management of Vataja Grahani.

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