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Standardization of Vaitaran Basti: Integrating Physicochemical Properties and HPTLC Fingerprinting for Enhanced Quality Control

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Abstract

The standardization of Vaitaran Basti was conducted using three samples (200 ml each with *Gomutra*) through organoleptic, physicochemical, and HPTLC fingerprinting techniques to ensure quality and consistency. Organoleptic evaluation assessed sensory characteristics such as colour, odour, and texture. Physicochemical analysis revealed that the Loss on Drying (LOD) ranged from 73.84% to 74.22%, indicating consistent moisture content. The pH levels were slightly acidic, between 3.65 and 3.73. Specific Gravity (SG) values ranged from 1.037 to 1.045, and the Refractive Index (RI) was consistent at 1.314-1.315, reflecting uniform optical properties. The total solid content varied slightly, from 25.02% to 25.87%. HPTLC fingerprinting provided distinct chromatographic profiles for each sample, confirming the presence of essential chemical compounds. The results demonstrated a high degree of uniformity across all samples, ensuring reproducibility and reliability in the formulation of *Vaitaran Basti*. These findings support the therapeutic use of the standardized formulation in clinical settings.

Keywords: *Vaitaran Basti*, standardization, organoleptic, physicochemical, HPTLC, *Gomutra Arka*

Introduction

Basti is an important Ayurvedic therapy among the five therapeutic procedures in *Panchakarma*. According to *Ayurvedic* principles, *Basti* is significantly more crucial in disease management than a conventional enema. *Basti Chikitsa* is considered as *Ardha Chikitsa* in *Ayurveda*. *Ayurvedic* classics describe various types of *basti*, each tailored to address specific ailments. *Vaitarana Vasti* is a distinct type of *basti* with a unique formulation and specific indications for treatment. *Vaitarana Vasti* is now widely practiced and yields excellent results. The conditions treated with *Vaitarana Vasti* include *Amavata*, *Katisoola*, *Gridhrasi*, infertility, and *Vishamajwara*, among others. Classical references for *Vaitarana Vasti* are found in texts such as *Chakradutta*, *Vrindhamadhava*, and *Vangasena*. Each Acharya presents slightly different formulations. In clinical practice, the ingredients are often adjusted based on the specific disease conditions
The ingredients for *Vaitarana basti* include *Saindhava Lavana*, *Guda*, *Amlika*, *Gomutra* or *Godugda*, and a small amount of *Ishat Taila* in the prescribed quantities. The specific formulations may vary slightly according to different *Acharayas*. *Gomutra* is a significant element of Indian tradition, revered not only for its sacredness but also for its various medicinal applications. Cow urine is one of the five contents of *Panchagavya* which obtain from cow. Cow urine can be used as a medicine to manage both curable and incurable diseases. In *Vaitaran Basti* preparation, *Aacharya Chkradatta* mentioned ingredients as below

Table 1- ingredients used in Vaitaran Basti

Sr no.	Ingredients	Quantity
1	*Saindhav* (Rock salt)	1 *Karsha* (10 gm)
2	*Guda*(jeggary)	1 *Sukti* (25 ml)
3	*Sneha* (Taila)	*Ishat matra* (in required quantity)
4	*Chincha*(Tamarind)	1 *Pala* (50 ml)
5	*Gomutra* (Cow urine)	1 *Kudava* (200 ml)

Aim and Objective

1. To prepare *Vaitaran Basti* following the prescribed classical method.
2. Standardization of *Vaitaran Basti* through Physico-chemical study and HPTLC.

Materials and methods

1. The standardization of *Vaitaran Basti* was conducted using three distinct samples, which were evaluated through organoleptic, physicochemical, and HPTLC fingerprinting techniques to ensure quality and consistency.
2. Organoleptic analysis of the three *Vaitaran Basti* samples focused on key sensory parameters such as taste, colour, odour, and texture, providing baseline data for standardization.
3. Physicochemical studies of the *Vaitaran Basti* samples measured pH, viscosity, solid contents and specific gravity, ensuring each sample met the established parameters for therapeutic use.
4. HPTLC fingerprinting of the three samples of *Vaitaran Basti* provided a detailed chromatographic profile, which validated the presence of key chemical compounds necessary for efficacy.
5. The comprehensive analysis across organoleptic, physicochemical, and HPTLC tests demonstrated the reproducibility and standardization of *Vaitaran Basti*, ensuring the preparation's reliability and therapeutic value.

Preparation of *Vaitaran Basti*

- There was no specific description of the method of preparation; hence, the same procedure as that of *Niruha Basti* was adopted.
- First, 10 gm of *Saindhava Lavana* was added, followed by 25 ml of *Gudapak*, which was triturated well until an amalgam was formed.
- 50 ml of ***Sukhoshna Murchhit Tila Taila*** was then added and mixed thoroughly, followed by 50 gm of *Chincha Kalka*. Finally, *Drava Dravya* in the form of either 200 ml of *Gomutra* was added and mixed until a homogeneous mixture was obtained.
- **Tamarind paste *(Chincha Kalka)*:** 30 gm of *Chincha* was soaked in 50 ml of water (at room temperature) overnight. The fibrous and seed parts were removed, and the remaining portion was filtered through a fine cotton cloth.
- **Jaggery**: 25 gm of *Jaggery* was melted by adding 10 ml of hot water, mixed gently, and then filtered.
- **Cow urine**: Fresh cow urine was used, ensuring that it was not turbid or had a strong pungent smell. Foaming was observed when mixed with other contents, indicating freshness and quality.

Table 2 - Organoleptic study of Vaitaran Basti

Characteristic	Colour	Odour	Touch	Taste
Sample 1(VB-200 ml GM)	Brownish Yellow	Characteristic	Liquid	Salty
Sample 2(VB-200 ml GM)	Brownish Yellow	Characteristic	Liquid	Salty
Sample 3(VB-200 ml GM)	Brownish Yellow	Characteristic	Liquid	Salty

In the standardization of *Vaitaran Basti* (VB), organoleptic parameters play a crucial role in assessing the quality and consistency of the formulation. Organoleptic properties refer to characteristics that can be evaluated using the senses, such as **colour**, **odour**, **touch**, and **taste**. These parameters help ensure that the formulation is uniform and acceptable for therapeutic use.

Table 3 - Physico-chemical study of Vaitaran Basti

Parameters	LOD	pH	SG	RI	Total Solid Content
Sample 1(VB-200 ml GM)	74.22	3.66	1.037	1.314	25.87
Sample 2(VB-200 ml GM)	74.17	3.65	1.045	1.315	25.02
Sample 3(VB-200 ml GM)	73.84	3.73	1.043	1.315	25.45

This table displays the physicochemical characteristics of 18 samples of Vaitaran Basti (VB) The analyzed parameters include Loss on Drying (LOD), pH, Specific Gravity (SG), Refractive Index (RI), and Total Solid Content. Each parameter provides valuable information regarding the physical and chemical stability, consistency, and quality of the formulation.

The preparation of samples for the physico-chemical study of **LOD (Loss on Drying)** involved taking 10 ml of *Vaitaran basti* and drying the samples in an oven at a controlled temperature until constant weight was achieved, ensuring accurate moisture content analysis.

For **pH**, 10 ml of *Vaitaran basti* was collected and homogenized. The pH of the samples was measured using a calibrated pH meter to assess the acidity or alkalinity of the mixture.

For **Specific Gravity (SG)**, 10 ml of *Vaitaran basti* was used, and the SG was determined using a calibrated hydrometer or pycnometer, measuring the density of the liquid in relation to water.

To assess **Total Solid Content**, 10 ml of *Vaitaran basti* was evaporated under controlled conditions, leaving only the solid residues behind. The remaining solids were then weighed to calculate the total solid content in the sample.

HPTLC

HPTLC fingering of *Vaitaran Basti*

The HPTLC analysis of the methanol extract from all samples of Vaitaran Basti, prepared with *Gomutra*, was conducted at a sample concentration of 10.0 µL. To prepare the test solutions, 5 g of each sample was weighed into a beaker, and 100 ml of methanol was added. The mixture was sonicated for 15 minutes and then filtered using simple filter paper. The resulting filtrate was utilized as the test solution for HPTLC fingerprinting. Chromatography was performed on 10 × 10 cm thin layer chromatography (TLC) plates coated with a 0.2 mm layer of silica gel 60 F254 (Merck) on aluminium sheets. Samples were applied to the plates as 6 mm wide bands using a Linomat 5 sample applicator (CAMAG, Switzerland). The plates were developed to a distance of 80 mm from the base using a mobile phase consisting of Toluene, Ethyl Acetate, and Methanol in a 9:1:1 v/v/v ratio within a CAMAG twin-trough chamber saturated with the mobile phase vapor. After drying, the plates were scanned post-derivatization at 254 nm and 366 nm using a CAMAG TLC scanner 3 with winCATS 4 software (CAMAG, Switzerland).

HPTLC CHROMATOGRAM@254 nm

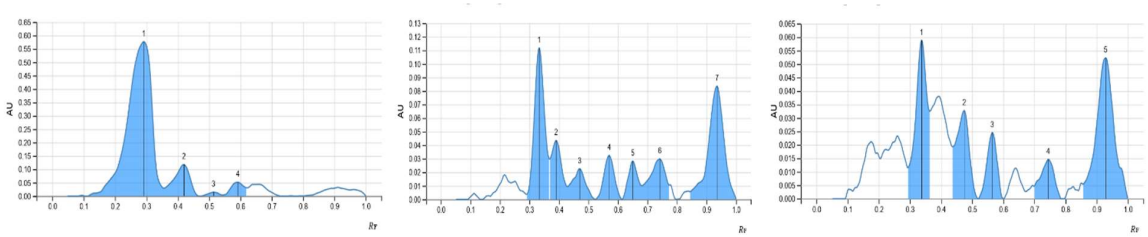
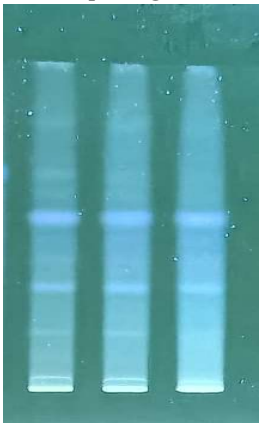


Table 4 - Rf value @ 254nm

Tract	Rf value						
Track 1	0.217	0.333	0.390	0.574	0.650	0.734	0.944
Track 2	0.333	0.390	0.470	0.570	0.650	0.741	0.936
Track 3	0.337	0.474	0.564	0.744	0.929		

HPTLC plate @ 254 nm track 1 to 3



HPTLC CHROMATOGRAM@366 nm

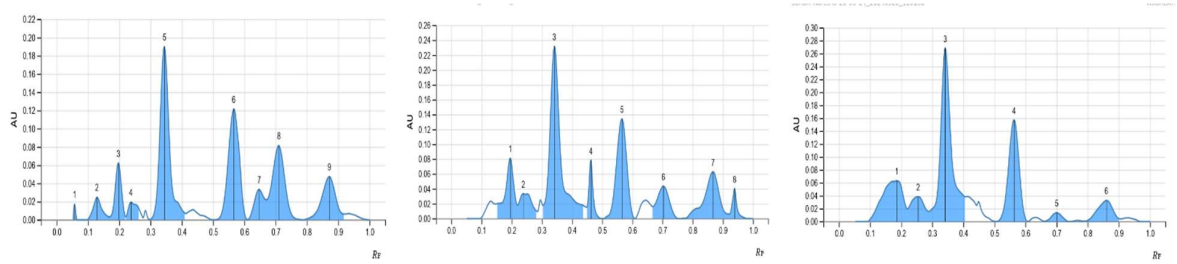
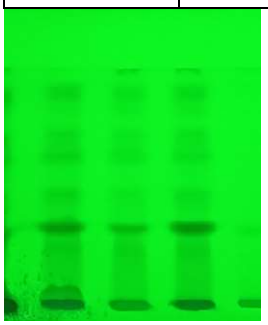


Table 5 - Rf value @366 nm

HPLC plate @ 366nm Track 1 to 3

Tract	Rf value								
Track 1	0.057	0.129	0.197	0.237	0.344	0.566	0.647	0.710	0.871
Track 2	0.196	0.239	0.341	0.463	0.566	0.703	0.867	0.939	
Track 3	0.186	0.254	0.341	0.563	0.700	0.860			



Results

Organoleptic study

Colour Across all samples, the colour was consistently described as Brownish Yellow. **Odour** All samples exhibited a **characteristic** odour. This is characteristic of formulations containing *Gomutra*, reflecting its acidic nature due to the presence of volatile compounds developed during the preparation. **Touch** The samples were all described as **Liquid**, showing consistency in the viscosity and flow characteristics of the *Vaitaran Basti.* **Taste** The taste across all samples was uniformly **Salty**, which is expected due to the inclusion of ***Saindhava Lavana*** (rock salt) in the preparation.

Physicochemical study

Loss on Drying (LOD) The LOD values for the samples were consistent, ranging from 73.84% to 74.22%, indicating similar moisture or volatile content across all three samples. **pH** The pH levels of the samples were slightly acidic, ranging from 3.65 to 3.73, with minimal variation, suggesting uniform acidity. **Specific Gravity (SG)** The specific gravity ranged between 1.037 and 1.045, indicating consistent density among the three samples. **Refractive Index (RI)** The refractive index was nearly identical for all samples, with values of 1.314 and 1.315, reflecting similar optical properties. **Total Solid Content** The total solid content showed minor variation, ranging from 25.02% to 25.87%, indicating a similar concentration of solid matter across the samples.

HPTLC @254 nm

Common Rf Values - **0.333-0.337** (Tracks 1, 2, 3) and **0.390** (Tracks 1, 2) indicate shared compounds.

Unique Rf Values - **0.744** in Track 3 and **0.944** in Track 1 suggest unique components.

HPTLC @366 nm

Common Rf Values - Rf values **0.341** and **0.566** are common across Tracks 2 and 3.

Unique Rf Values - Track 1 includes a range of unique lower Rf values, particularly **0.057** and **0.871**, suggesting a different composition compared to Tracks 2 and 3.

Each parameter showed minor differences, confirming the overall consistency of the Vaitaran Basti samples.

Discussion

In the organoleptic study of *Vaitaran Basti* (VB), all three samples showed consistent properties: brownish-yellow color, characteristic odor, liquid touch, and salty taste, indicating uniformity in formulation. The physicochemical analysis revealed minor variations: LOD ranged from 73.84% to 74.22%, pH from 3.65 to 3.73, specific gravity (SG) from 1.037 to 1.045, refractive index (RI) around 1.314–1.315, and total solid content between 25.02% and 25.87%, indicating stable and reproducible formulations.

HPTLC fingerprinting at 254 nm showed similar Rf values across tracks, with notable peaks at Rf 0.333, 0.390, and 0.650, while at 366 nm, Rf values like 0.566, 0.647, and 0.871 appeared in multiple tracks. These consistent chromatographic profiles across samples suggest the presence of similar bioactive compounds, reinforcing the formulation's quality and potential therapeutic effectiveness.

Conclusion

The standardization of *Vaitaran Basti* demonstrated consistent quality across all samples through organoleptic, physicochemical, and HPTLC analysis. Uniformity in moisture content, pH, specific gravity, and total solid content was observed, alongside distinct chemical profiles confirmed by HPTLC. These results ensure the formulation's reproducibility and reliability, supporting its therapeutic application in clinical practice.

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