



Organoleptic and Physicochemical Evaluation of *Tandulodaka* (Red Rice Water): An Analytical Study

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Abstract -

Introduction: *Tandulodaka* (Red Rice Water) is an aqueous preparation of Ayurvedic pharmacy. It is frequently used as an *Anupana* (adjuvant), *Bhavana Dravya* (trituration medium), and supportive therapeutic preparation. Although it has been used traditionally for centuries, there are no scientific studies available about its quality criteria.

Objectives: This paper is meant to develop *Tandulodaka* using the classical procedure from red rice and set up initial organoleptic and physicochemical quality criteria for the product.

Material & Methods: *Tandulodaka* was developed from the authenticated red rice (*Oryza sativa* L.) and drinking water. Classical process of soaking was applied for the development. Organoleptic features like colour, odour, taste, and appearance were studied. Physicochemical tests like pH, Density, Viscosity, and Rancidity were conducted through laboratory methods. All applicable experiments were conducted as per standard guidelines, and the data are expressed as mean $\pm$ SD.

Result: The formulation of *Tandulodaka* showed a reddish-white to pale pink colour with slight turbidity, having typical odor of rice with a bland and slightly starchy taste. The physicochemical study revealed near-neutral pH (6.45 ± 0.03), specific gravity of 1.01 ± 0.01 and viscosity of 2.15 ± 0.05 cP, which suggest stability and low viscosity of the aqueous formulation.

Conclusion: This study provides preliminary standards of organoleptic and physicochemical evaluation of *Tandulodaka* prepared from red rice. The results can serve as reference points for future investigations on this classical Ayurvedic formulation.

Keywords – *Tandulodaka*, Red Rice Water, Ayurvedic formulation, Organoleptic Evaluation, Physicochemical Standardization

Introduction

Standardization is the core element of drug development that provides quality, identity, safety, and reproducibility of medicines. In the context of Ayurvedic pharmaceuticals (Bhaishajya Kalpana), the quality of a formulation depends not only on the purity of raw materials used but also on the method of preparation. Hence, developing the scientific standardization criteria for classical formulations is vital for evidence-based practice and the integration of Ayurveda in modern healthcare systems.

*Tandulodaka*¹ is a classical aqueous preparation prepared by soaking rice (*Tandula*) in potable water for a defined period of time. According to classical Ayurvedic treatises, *Tandulodaka*² has been used as *Anupana*³ (adjuvant), *Bhavana Dravya*³ (trituration medium), and a supportive preparation in many formulations. As the name implies, it has the qualities of Laghu (lightness) and nourishment and easily digested; hence it was used in conditions like digestion problems, dehydration, burning sensation, urinary conditions, and general debility.

Although *Tandulodaka*^{3,4} is an easy-to-prepare formulation, various factors like rice used, quality of water, soaking time, and environmental factors may affect the extraction of water-soluble substances, thus affecting the physicochemical attributes of the formulation. Hence, it requires standardization for consistent pharmaceutical quality.

Aim

To prepare *Tandulodaka* (Red Rice Water) according to Ayurvedic pharmaceutical principles and establish its preliminary organoleptic and physicochemical quality standards.

Objectives

1. To prepare *Tandulodaka* from authenticated red rice (*Oryza sativa* L.) following the classical Ayurvedic method.
2. To evaluate the organoleptic characteristics of the prepared *Tandulodaka*, including colour, appearance, odour, and taste.
3. To determine the physicochemical parameters of *Tandulodaka*, namely pH, specific gravity, viscosity, and rancidity.

Materials and Methods

Study Design - The present study was an experimental pharmaceutical investigation conducted to prepare *Tandulodaka* (Red Rice Water) according to Ayurvedic pharmaceutical principles and evaluate its organoleptic and physicochemical characteristics. The study aimed to establish preliminary quality control parameters that may serve as reference standards for future pharmaceutical standardization.

Study Site - The pharmaceutical preparation and analytical evaluation were carried out in the Department of *Rasashastra and Bhaishajya Kalpana* (Ayurvedic Pharmaceuticals), Government Ayurved College, Dharashiv, Maharashtra, following standard laboratory procedures and Good Laboratory Practices (GLP).

Raw Materials –

Table 1. Raw Ingredients used for *Tandulodaka* (Red Rice Water) preparation^{1, 2, 3}

No.	Name	Dose	Specifications
1.	<i>Tandul</i> (Red Rice)	50 g.	Authenticated red rice (<i>Oryza sativa</i> L.) was procured from a local market. The grains were manually cleaned to remove foreign matter, dust particles, immature grains, and other impurities before use.
2.	<i>Sheeta Jala</i> (Water)	400 mL	Fresh potable water meeting laboratory quality requirements was used throughout the preparation process.

Preparation of *Tandulodaka*^{1, 2, 3, 4}

Tandulodaka was prepared following the classical Ayurvedic procedure with slight modifications to ensure laboratory reproducibility. 50 g. of cleaned red rice was thoroughly washed with potable water to remove adhering impurities. The washed rice was transferred into a clean glass container containing the required quantity of 400 mL cold water. The mixture was allowed to soak undisturbed for the 4 to 6 hours at room temperature. After completion of the soaking period, the supernatant liquid was carefully decanted and filtered through a clean muslin cloth to remove suspended particulate matter.

The freshly prepared filtrate was designated as **Sample No. 1 – *Tandulodaka* (Red Rice Water)** and subjected immediately to organoleptic and physicochemical evaluation.

Organoleptic Evaluation⁵

Organoleptic examination was carried out using standard sensory evaluation methods to assess the physical characteristics of the freshly prepared *Tandulodaka*.

Colour and appearance were observed under natural daylight against a white background. Odour was assessed immediately after opening the sample container. Taste was evaluated using a small quantity of the freshly prepared sample under safe laboratory conditions.

Table 2. Organoleptic Evaluation Parameters⁵

Parameter	Method of Evaluation
Colour	Visual observation under daylight
Appearance	Visual examination for clarity and turbidity
Odour	Sensory evaluation immediately after opening the container
Taste	Organoleptic assessment using a small quantity of freshly prepared sample

Physicochemical Evaluation

The prepared *Tandulodaka* was subjected to physicochemical analysis using standard laboratory procedures. The following parameters were evaluated:

Determination of pH of *Tandulodaka*⁶ - The pH of a 5% (w/v) solution was measured using a calibrated digital pH meter at room temperature. Three independent readings were recorded, and the mean value of pH was calculated.

Determination of Specific Gravity of *Tandulodaka*⁷ - Specific gravity was determined using a calibrated specific gravity bottle by comparing the weight of the sample with that of distilled water at identical temperature conditions.

Determination of Viscosity of *Tandulodaka*⁸ - Viscosity was measured using a Brookfield digital viscometer under standardized laboratory conditions and expressed in centipoise (cP).

Determination of Rancidity of *Tandulodaka*⁹ - Rancidity was evaluated using the standard qualitative method to detect oxidative deterioration of lipid components. The sample showed no evidence of rancidity.

Results

The freshly prepared *Tandulodaka* (Red Rice Water) was evaluated for its organoleptic and physicochemical characteristics to establish preliminary quality control parameters. The observations are summarized below.

Organoleptic Evaluation

Organoleptic evaluation provides the primary assessment of the identity, appearance, and acceptability of a pharmaceutical preparation. Freshly prepared *Tandulodaka* exhibited characteristic sensory properties indicative of a properly prepared aqueous rice extract.

Table 3. Organoleptic Characteristics of *Tandulodaka* (Red Rice Water)

Sr. No.	Parameter	Observation
1	Colour	Reddish-white to light pink
2	Appearance	Slightly turbid, homogeneous liquid
3	Odour	Characteristic fresh rice odour
4	Taste	Bland with a mild starchy flavour

The reddish-white appearance observed in the preparation may be attributed to the diffusion of natural pigments and water-soluble constituents from the bran layer of red rice during soaking. The slight turbidity indicates the presence of suspended starch granules and other soluble components, while the characteristic rice odour and bland taste confirm the freshness of the preparation.

Physicochemical Evaluation - The physicochemical parameters were determined to establish baseline quality characteristics of *Tandulodaka*.

Table 4. Physicochemical Characteristics of *Tandulodaka* (Red Rice Water)

Sr. No.	Parameter	Result
1	pH (5% w/v solution)	6.45 ± 0.03
2	Specific Gravity	1.01 ± 0.01
3	Viscosity (cP)	2.15 ± 0.05
4	Rancidity	Absent

Interpretation of Physicochemical Parameters

pH - The pH of *Tandulodaka* was 6.45 ± 0.03 , indicating a slightly acidic to near-neutral nature. This pH range is favourable for maintaining the stability of aqueous herbal preparations and is unlikely to cause irritation during oral administration. The observed value also suggests that the preparation was fresh and had not undergone undesirable microbial fermentation.

Specific Gravity - The specific gravity was found to be 1.01 ± 0.01 , which is only marginally higher than that of distilled water. This observation reflects the presence of dissolved carbohydrates, minerals, and other water-soluble constituents extracted from red rice during the soaking process without significantly increasing the density of the preparation.

Viscosity - The viscosity of the sample was 2.15 ± 0.05 cP, indicating a low-viscosity aqueous liquid. This property facilitates ease of handling, filtration, and oral administration while supporting its traditional use as an *Anupana* and *Bhavana Dravya* in Ayurvedic pharmaceuticals.

Rancidity - No evidence of rancidity was observed during qualitative evaluation. The absence of oxidative deterioration indicates that the freshly prepared *Tandulodaka* retained its acceptable pharmaceutical quality and was suitable for immediate use.

The analytical evaluation demonstrated that *Tandulodaka* prepared from red rice possesses consistent organoleptic and physicochemical characteristics. The preparation exhibited a characteristic reddish-white, slightly turbid appearance with a mild rice odour and bland taste. The near-neutral pH, low specific gravity, and low viscosity are consistent with the properties expected of a freshly prepared aqueous rice extract. The absence of rancidity further supports the freshness and quality of the preparation. These findings provide preliminary reference values that may be utilized for pharmaceutical standardization and quality control of *Tandulodaka* in future studies.

Discussion

The present study was undertaken to establish preliminary pharmaceutical quality parameters for *Tandulodaka* (Red Rice Water) through organoleptic and physicochemical evaluation. Although *Tandulodaka* is a classical Ayurvedic preparation frequently employed as an *Anupana* (adjuvant) and *Bhavana Dravya* (trituration medium), scientific reports describing its quality attributes remain scarce. The findings of the present investigation contribute baseline data that may support its pharmaceutical standardization.

Organoleptic evaluation is an important initial step in the quality assessment of Ayurvedic formulations, as it helps identify the authenticity, freshness, and overall acceptability of the preparation. In the present study, *Tandulodaka* exhibited a **reddish-white to light pink colour**, a **slightly turbid appearance**, a **characteristic rice odour**, and a **bland, mildly starchy taste**. These characteristics are consistent with the extraction of water-soluble starch, pigments, and other natural constituents from the bran layer of red rice during soaking. The absence of abnormal colour changes, unpleasant odour, or fermentation-related characteristics indicated that the preparation was fresh and prepared under appropriate laboratory conditions.

The **pH (6.45 ± 0.03)** of *Tandulodaka* was close to neutrality, suggesting that the preparation is chemically stable and suitable for oral administration. A near-neutral pH also minimizes the likelihood of irritation to the gastrointestinal mucosa and indicates that the sample had not undergone undesirable microbial fermentation during preparation. Similar observations have been reported in studies evaluating aqueous rice extracts, where pH values generally range from slightly acidic to neutral depending on rice variety and preparation conditions.

The **specific gravity (1.01 ± 0.01)** was only marginally higher than that of distilled water, reflecting the presence of dissolved carbohydrates, amino acids, minerals, and other water-soluble constituents extracted from red rice. This finding is expected because *Tandulodaka* is primarily an aqueous preparation containing relatively low concentrations of dissolved solids. The observed value supports its traditional use as a light and easily digestible pharmaceutical vehicle.

Viscosity is an important quality parameter influencing the handling, filtration, pouring characteristics, and administration of liquid formulations. The measured **viscosity (2.15 ± 0.05 cP)** indicates that *Tandulodaka* behaves as a low-viscosity aqueous liquid. Such rheological characteristics are advantageous for its traditional use as an *Anupana* and *Bhavana Dravya*, as they facilitate uniform mixing with powdered drugs and ease of oral administration. The slight increase in viscosity compared with pure water may be attributed to the presence of soluble starch and polysaccharides released during the soaking process.

The **absence of rancidity** further confirmed the freshness and acceptable quality of the prepared sample. Since oxidative deterioration mainly affects lipid-containing preparations, the lack of rancidity was anticipated but nevertheless supports the suitability of freshly prepared *Tandulodaka* for pharmaceutical use.

From an Ayurvedic perspective, *Tandulodaka* is valued for its *Laghu* (light), *Mridu* (mild), and nourishing properties. The analytical findings observed in the present study complement these classical descriptions. The low specific gravity and viscosity indicate a light aqueous preparation, while the near-neutral pH and absence of deterioration support its use as a safe pharmaceutical medium. These observations illustrate how modern analytical methods can provide objective evidence for the quality attributes described in traditional Ayurvedic literature.

Despite these encouraging findings, the present investigation has certain limitations. The study was conducted using a single batch prepared from one variety of red rice, and only selected physicochemical parameters were evaluated. Advanced analytical investigations such as determination of total soluble solids, microbial load, mineral profile, carbohydrate content, chromatographic fingerprinting, and shelf-life evaluation were beyond the scope of the present work. Future studies incorporating these analyses would strengthen the scientific standardization of *Tandulodaka*.

Overall, the present investigation establishes preliminary pharmaceutical standards for *Tandulodaka* prepared from red rice and provides a scientific basis for future quality control, formulation development, and pharmacological research.

Conclusion

The present study successfully established preliminary organoleptic and physicochemical quality parameters for ***Tandulodaka (Red Rice Water)*** prepared according to Ayurvedic pharmaceutical principles. The formulation demonstrated characteristic sensory properties, including a reddish-white, slightly turbid appearance, characteristic rice odour, and a bland, mildly starchy taste. Analytical evaluation revealed a near-neutral pH, low specific gravity, low viscosity, and absence of rancidity, indicating that the preparation was fresh, stable, and suitable for pharmaceutical use.

The findings provide baseline reference values that may assist in the quality control and pharmaceutical standardization of *Tandulodaka*. These data may also contribute to the development of standard operating procedures for its preparation in Ayurvedic pharmaceutical practice. Further studies involving phytochemical profiling, microbiological evaluation, stability testing, and pharmacological validation are recommended to establish comprehensive quality standards and expand the scientific evidence supporting this classical preparation.

References

1. Sharngadharadharya. *Sharngadhara Samhita*. Tripathi B, editor and commentator. Reprint ed. Varanasi: Chaukhamba Surbharati Prakashan; 2015. Madhyama Khanda, Pramathya Adhyāya, verse 32. p.88.
2. Joshi M. *Bhaishajya Kalpana Vidnyana: A Textbook of Ayurvedic Pharmaceutics*. Book Series CSP M-06. Pune: Ayurvedokta Prakashan; 2014. p. 121–122.
3. Easy Ayurveda. Rice Water (*Tandulodaka*): Preparation, Benefits, Uses [Internet]. Easy Ayurveda; 2017 Oct 11 [cited 2026 Jul 19]. Available from: <https://www.easyayurveda.com/rice-water-tandulodaka/>
4. Chithambharan A, Pottail L, Sharma SC, Mirle RM, Rajalakshmi R, Ponnusamy A. Conventional and scientific uses of rice-washed water: a systematic review. *J Food Sci Technol*. 2024;61(3):414-428. doi:10.1007/s13197-023-05722-2. PMID: 38327867; PMCID: PMC10844178. Available from: https://pubmed.ncbi.nlm.nih.gov/38327867/?utm_source=chatgpt.com
5. Koroma, Lahai & Alpha, Mohamed & Kpaka, Jonathan & Kpaka, Augustine. (2022). Organoleptic Evaluation and Physiochemical Characteristics of Powdered Plant Organs of the Traditional Medicinal Plant *Caloncoba Echinata*. *International Journal of Innovation in Engineering*. 2. 14-22. 10.59615/ijie.2.3.14.
6. Tiwari, Ritu & Mahalpure, Gaurav. (2025). A Detailed Review of pH and its Applications. *Journal of Pharmaceutical and Biopharmaceutical Research*. 6. 492-505. 10.25082/JPBR.2024.02.001.
7. Rabb, Umakant. (2024). Assessment of density and specific gravity tests of some selected Ayurvedic medicinal plants. *GSC Biological and Pharmaceutical Sciences*. 26. 006-013. 10.30574/gscbps.2024.26.3.0076.
8. Mohammed Nasiru Bello "Determination of Viscosity of Liquids" *International Journal of Scientific Research in Science and Technology(IJSRST)*, Online ISSN : 2395-602X, Print ISSN : 2395-6011, Volume 4, Issue 10, pp.379-384, September-October-2018.
9. Okparanta, Susan. (2018). Assessment of Rancidity and Other Physicochemical Properties of Edible Oils (Mustard and Corn Oils) Stored at Room Temperature. *Journal of Food and Nutrition Sciences*. 6. 70. 10.11648/j.fns.20180603.11.