Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol.14 , Issue 28s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Assessment of Moisture Content in the form of an Indicator of Ahara Samskara Effect

Dr. Smitha N[1], Dr. Vasudha Asutkar[2], Dr. Madhuri Bhide[3], Dr. Savita Nilakhe[4], Dr. Sachin Kulkarni[5], Dr.Sheetal Asutkar[6], Dr. Amit Paliwal[7]

[1]PG Scholar, Dept. of Samhita Siddhanta and Sanskrit, Bharati Vidyapeeth Deemed to be University College of Ayurveda, Pune, 411043, Maharashtra

[2]MD PhD Samhita Siddhanta, Associate Professor, Dept of Samhita, Siddhanta & Sanskrit, Bharati Vidyapeeth Deemed to be University College of Ayurveda, Pune, 411043, Maharashtra.

[3]MD PhD Samhita Siddhanta, Professor HOD, Dept of Samhita, Siddhanta & Sanskrit, Bharati Vidyapeeth Deemed to be University College of Ayurveda, Pune, 411043, Maharashtra.

[4]MD Samhita Siddhanta, MA Sanskrit, Professor, Dept of Samhita, Siddhanta & Sanskrit, Bharati Vidyapeeth Deemed to be University College of Ayurveda, Pune, 411043, Maharashtra.

[5]MD PhD Samhita Siddhanta, Associate Professor, Dept of Samhita, Siddhanta & Sanskrit, Bharati Vidyapeeth Deemed to be University College of Ayurveda, Pune, 411043, Maharashtra.

[6]MS PhD Shalyatantra, Professor HOD, Dept of Shalyatantra Mahatma Gandhi Ayurveda College, Hospital and Research Centre, Sawangi, Wardha, 442001, Maharashtra

[7]MS PhD Shalyatantra, Professor, Dept of Shalyatantra , D. Y. Patil College of Ayurved and Research Center Pimpri Pune, 411018, Maharashtra

***Corresponding Author,**

Dr. Vasudha Asutkar

MD PhD Samhita Siddhanta, Associate Professor, Dept of Samhita, Siddhanta & Sanskrit, Bharati Vidyapeeth Deemed to be University College of Ayurveda, Pune, 411043, Maharashtra.

Email ID: vasudha.asutkar@bharatividyapeeth.edu

.Cite this paper as: Dr. Smitha N, Dr. Vasudha Asutkar, Dr. Madhuri Bhide, Dr. Savita Nilakhe, Dr. Sachin Kulkarni, Dr.Sheetal Asutkar, Dr. Amit Paliwal (2025) Mental Health Assessment and Computational Frameworks. Journal of Neonatal Surgery, 14, (28s) 1140-1144

ABSTRACT

This study aims to scientifically validate the Ayurvedic principle of Ahara Samskara (food processing) by analyzing the changes in the moisture content of Shashtik Shali (a 60-day rice variety) following Kala Samskara (time-based storage) and Agni Samskara (heat processing). The research employs the oven-drying method, a standard technique in modern food science, to quantitatively assess the physicochemical transformations. Freshly harvested Shashtik Shali showed a moisture content of 4.4%. After being stored for eight months and subsequently dry-roasted, the grains' moisture content was reduced to 4.0%. This quantifiable reduction serves as a tangible metric that correlates with the qualitative changes described in Ayurveda. The fresh grain's higher moisture content reflects a predominance of Jala and Prithvi Mahabhutas, making it highly nourishing (Brimhana), but potentially contributing to Ama (toxins) in individuals with weak digestion. The processed grain, with its reduced moisture, reflects a shift towards Agni and Vayu Mahabhutas, acquiring qualities that are lighter (Laghu), drying (Ruksha), and more stimulating to the digestive fire (Dipana), making it therapeutically beneficial for managing conditions like Mandagni (weak digestion) and Kapha Dosha aggravation. The findings bridge ancient Ayurvedic wisdom with contemporary analytical methods, demonstrating that traditional food processing techniques are sophisticated interventions that purposefully modulate a food's properties for specific therapeutic and health-promoting effects

Keywords: *Ayurveda, Ahara Samskara, Shashtik Shali, Moisture Content, Agni Samskara, Kala Samskara, Food Science, Traditional Knowledge, Dhatu-poshana, Agni*

INTRODUCTION

In Ayurveda, **Ahara (food)** is regarded not merely as sustenance but as a dynamic determinant of health that constantly interacts with the body's physiology, psychology, and environment; as one of the Trayopastambha (three sustaining pillars), it is the primary driver of Ojas (vital essence), Agni (digestive/metabolic fire), and Dhatu-poshana (tissue nourishment), thereby functioning as a preventive, promotive, and curative factor. Unlike modern nutrition, which emphasizes calories and macronutrients, Ayurveda classifies food through its Rasa (taste), Guna (qualities), Virya (potency), Vipaka (post-digestive effect), and Prabhava (unique action), stressing that a wholesome diet (Hitakara Ahara) is context-specific, varying with constitution (Deha prakriti), season (Rutu), geography (Desha), and disease state (Vyadhi avastha). Central to this framework is the concept of Ahara Samskara (food processing), which is not a mere preparatory act but a transformative intervention that modifies Gunas, enhances digestibility (Agnibala), reduces or neutralizes harmful properties, potentiates therapeutic actions (Prabhava), and improves palatability, stability, and shelf-life.

Acharya Charaka in Charaka Samhita highlight the importance of Ahara-vidhi-visheshayatana1 (guidelines for food intake) and describe about the Samskaras such as Toya-agni-sannikarsha (exposure to water and fire), Shoucha (washing), Manthana (churning), Desha (region), Kaala (time), Bhajana (vessel), and Bhavana (trituration) alter the inherent nature and properties of raw food materials, thereby enhancing their digestibility and safety. The influence of Ahara Samskara, particularly the sequential impact of Kala (time-based transformation) and Agni (heat processing through Bharjana), on any Ahareeya Dravya[food substance] can be scientifically validated through moisture content testing, which serves as a key indicator of the physicochemical changes occurring in the grain during these processes.

Among the wide range of grains, 2Shashtik Shali (a variety of rice harvested in 60 days) occupies a unique place in Ayurveda due to its nourishing (Brimhana), strengthening, and restorative properties. When subjected to Agni Samskara (heat processing) and Kala Samskara (time-based transformation), its physical and chemical properties, especially water content, undergo significant modification. Such transformations not only influence texture, palatability, and shelf-life but also the potency and therapeutic applicability of Shashtik Shali in clinical practice.

In modern food science, the moisture content test serves as a vital analytical parameter to study these changes. 3Techniques such as oven drying, distillation, moisture analyzers, and Karl Fischer titration quantify the percentage of water in the substance, which in turn reflects freshness, stability, and microbial safety. A reduction in moisture generally enhances shelf-life and stability but may alter nutritional and organoleptic qualities.

Thus, analyzing Shashtik Shali undergoing Agni and Kala Samskara through moisture content testing provides a scientific basis to correlate classical Ayurvedic principles with contemporary food science.

AIM AND OBJECTIVES:

To assess the changes in properties of Shashtik Shali, due to effect of Agni and Kala Samskara by Moisture content analysis through Moisture content analysis by Laboratory test.

MATERIALS AND METHODS:

Moisture Content Test –

The **moisture content test** is a standard analytical method in food science to measure the percentage of water present in a food substance[4]. Methods includes oven drying, moisture analyzers, distillation, or Karl Fischer titration. The Significance of this test is it Indicates freshness, shelf-life, and microbial stability of food. Lower moisture generally increases shelf life but may affect texture and nutrition[5].

Methods of Moisture Content Determination

1. Oven Drying Method[6]

The oven drying method is one of the most widely used and standardized techniques for determining moisture content in cereals and food materials. In this method, a known quantity of the sample is dried in a hot air oven at a controlled temperature, usually between **100–105°C**, until a constant weight is achieved. The loss in weight is interpreted as the moisture content of the sample. This method is considered reliable for routine analysis, though it may cause slight decomposition of volatile compounds or bound water, leading to minor errors.

2. Distillation Method[7]

The distillation method involves co-distilling the food sample with an immiscible solvent, commonly **toluene or xylene**, which helps in separating and quantifying the moisture present. The water is collected in a graduated trap and directly measured. This technique is particularly useful for samples containing volatile oils or substances that may decompose at oven temperatures, such as spices and oilseeds.

3. Karl Fischer Titration Method[8]

Karl Fischer titration is a **chemical method** specifically designed to measure water content, based on the quantitative reaction of water with iodine and sulfur dioxide in the presence of a base (typically imidazole or pyridine) and methanol. It is highly accurate and sensitive, capable of detecting moisture levels as low as **10 ppm**, and is widely used for pharmaceuticals, oils, and low-moisture foods where precision is crucial. However, it requires specialized reagents and instrumentation.

4. Infrared Moisture Analyzer Method[9]

Infrared moisture analyzers use infrared radiation to rapidly heat the sample, causing moisture to evaporate. The instrument continuously measures the loss of weight during heating, which is automatically calculated as moisture percentage. This method is fast, requires minimal sample preparation, and is suitable for routine or field analysis, though calibration and care must be taken to avoid thermal decomposition of sensitive compounds.

5. Electrical/Microwave Methods10

Electrical methods, such as dielectric or capacitance meters, and microwave drying techniques, determine moisture content by measuring the dielectric properties of the sample, which change with water content. These are rapid and non-destructive, often used for grains in storage or trade. While highly convenient, they require calibration against standard methods like oven drying for accuracy.

The Method adapted in the study was over drying method. Shashtik Shali is taken for the moisture content test. Shashtik Shali (Oryza sativa), commonly known as the 60-day rice variety where “Shashtik” denotes sixty and “Shali” means rice, belongs to the family Gramineae (botanically identified as Oryza nivara), and in the present study its sampling was undertaken for moisture content testing after undergoing Kala Sanskara for a storage period of eight months and Agni Samskara by Bharjana[Roasting] Method.

Freshly harvested Shashtik Shali (Oryza nivara, family Gramineae) grains were initially subjected to moisture content estimation using the standard oven-drying method, which involves controlled heating until a constant weight is achieved, thereby determining the percentage of inherent water present in the sample. Following the initial assessment, the residual grains were carefully preserved in a well-maintained storage environment with appropriate protection from moisture, pests, and microbial contamination, ensuring minimal external influence on their natural physicochemical properties. The stored sample was retained for a period of eight months, allowing the influence of Kala Samskara (time factor) to take effect on the grains.

After this maturation period, the sample was processed by Bharjana (dry roasting), representing the application of Agni Samskara (heat processing), which is traditionally known to reduce heaviness, enhance digestibility, and improve stability. Post-roasting, the grains were again subjected to moisture content determination by the oven-drying method, enabling a comparative analysis of the changes in water content induced by the sequential influence of Kala (time) and Agni (heat) Samskaras on Shashtik Shali.

RESULT:

Sample	Moisture Content (%)	Samskara Involved
Nava Shashtik Shali (new)	4.4%	None (fresh)
Bhrjita Shashtik (8 months)	4.0%	Kala + Agni Samskara

The moisture content analysis of Shashtik Shali showed that the freshly harvested (Nava) sample, without any processing, contained 4.4% moisture, while the sample that was first preserved for eight months (Kala Samskara) and then subjected to Bharjana or roasting (Agni Samskara) exhibited a slightly reduced moisture content of 4.0%, reflecting the combined effect of time-based storage followed by heat processing on the grain’s physicochemical characteristics.

DISCUSSION:

Analysis of Moisture Content Values in relation to Ahara Samskara of Shashtik Shali-

1. Nava Shashtik Shali (Moisture Content: 4.4%)The freshly harvested Nava Shashtik Shali, with a measured moisture content of 4.4%, represents the grain in its most unprocessed and vital state. At this stage, the grain exhibits a predominance of Jala Mahabhuta, supported by Prithvī Mahabhuta, which accounts for its inherent softness, cohesion, and slight heaviness. The expressed Gunas of the grain are Snigdha (unctuous), Laghu (light), Drava (fluid), Mridu (soft), and Sthira (stable), reflecting both its nutritive and functional potential. In Ayurvedic terms, Nava Shashtik functions as a Rasayana (rejuvenative), Rasa-vardhaka (enhancer of nutrition), Kapha-vardhaka (Kapha-promoting), and Balya (strength-promoting) agent, making it particularly suitable for individuals of Vata and Pitta Prakriti, as its natural coolness and unctuousness help pacify the dryness and heat inherent in these constitutions.

However, the high moisture content and pronounced Snigdhata also carry potential cautionary implications. In individuals with Mandagni (weak digestive fire), the combination of moisture and unctuousness can promote the formation of Ama (undigested metabolic toxins), which are considered the root cause of various diseases. Thus, while Nava Shashtik Shali is inherently nourishing and restorative, its consumption must be guided by the state of the digestive fire, Dosha balance, and overall metabolic capacity.

Even though the grain is inherently Laghu, its Brimhana (bulk-promoting) and Kapha-vardhaka properties suggest that in pathological conditions characterized by Ama or impaired Agni, additional processing or modification may be required to render it suitable for therapeutic use. This highlights the importance of contextual dietary application, as its Rasayana and Balya effects are maximized only in individuals with robust Agni and balanced Doshas.

2. Bhrjita Shashtik (Kala+ Agni Samskara, Moisture Content: 4.0%)The Bhrjita Shashtik Shali, subjected to Kala Samskara (8 months of storage) and processed by Bharjana (dry roasting with induced motion) , exhibits a slightly reduced moisture content of 4.0%, reflecting the combined effects of time-dependent drying and heat application. This processing induces a shift in elemental predominance, reducing the influence of Jala Mahabhuta while enhancing Agni and Vayu Mahabhutas. Consequently, the grain's primary Gunas transform to Ushna (heating), , Ruksha (dry), and an emergent Laghu (light) quality, which alters both its physical characteristics and therapeutic actions.

These transformations modulate the inherent nutritive and functional properties of Shashtik Shali. The roasted form is less Brimhana (bulk-promoting) compared to the fresh variant but gains Dipana (digestive-stimulating), Ama-nashaka (detoxifying), and Kapha-pachaka (Kapha-clearing) actions, making it particularly beneficial in Mandagni, Kapha-prakopa (Kapha aggravation), and Meda Dhatu vriddhi (adipose tissue excess) conditions. The reduction in moisture through roasting not only enhances digestibility but also prevents stagnation and Ama formation, aligning with the Ayurvedic principle that controlled heat processing strengthens Agni and lightens heavy, moist foods.

From a physicochemical perspective, the application of Agni Samskara (Bharjana) significantly alters the elemental and molecular composition of the grain. The reduction in water content decreases Jala Mahabhuta, while the thermal energy enhances the predominance of Agneya and Vayaviya components. These changes increase Rukshatva and Ushnatva, imparting Laghutva, which directly improves the grain’s digestibility and metabolic impact. Consequently, while roasted Shashtik is less nutritive in terms of Brimhana, it becomes metabolically stimulating and Kapha-modulating, illustrating how classical Samskara techniques strategically modify the functional and therapeutic profile of food.

The comparison between Nava and Bhrjita Shashtik demonstrates Ahara Samskara—through time and heat—induces measurable changes in both moisture content and elemental qualities, bridging classical Ayurvedic understanding with modern physicochemical observations. The slight reduction in moisture (4.4% → 4.0%) quantitatively reflects these changes and validates the role of Samskara in optimizing food for therapeutic purposes, highlighting the synergy between traditional knowledge and modern analytical methods.

Ultimately, this research serves as a foundational step toward a broader empirical validation of Ayurvedic principles. While this study focused on moisture content, future research could expand this methodology to other analytical parameters, such as proximate analysis, dietary fiber content, and the quantification of volatile compounds, to provide a more comprehensive profile of the changes induced by Ahara Samskara. Exploring different grains and processing techniques, such as steaming (Swedana) or fermentation , would further enrich our understanding. The integration of such scientific rigor with classical Ayurvedic knowledge is crucial for establishing a holistic nutritional paradigm that extends beyond mere macronutrient and calorie counting. This approach recognizes food not just as a source of energy, but as a dynamic substance whose preparation directly influences its ability to prevent disease, promote health, and serve as a powerful therapeutic tool, thereby highlighting the timeless relevance and precision of Ayurvedic science.

CONCLUSION:

This study analytically validated the Ayurvedic concept of Ahara Samskara by demonstrating that purposeful food processing induces measurable and therapeutic changes. Using moisture content analysis on Shashtik Shali rice, the study showed a reduction from 4.4% in the fresh grain to 4.0% after applying Kala (time) and Agni (heat) based processing. This moisture reduction signifies a shift from heavy, nourishing (Snigdha, Sthira) qualities to lighter, digestive-stimulating (Ruksha, Laghu) properties, aligning with changes in dominant Mahabhutas. The findings offer scientific evidence for classical Ayurvedic claims and set the stage for further multi-parameter research on food transformation through traditional processing methods

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