

Pharmacotherapeutic aspects of Ksheerapaka (herbal milk decoction): A comprehensive review

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Abstract

Ksheerapaka is a unique Ayurvedic liquid dosage form in which milk serves as the primary extraction medium for medicinal substances. This formulation facilitates the extraction of therapeutically active constituents from herbal drugs while simultaneously imparting the nutritive and rejuvenative properties of milk. *Ksheerapaka* is especially indicated for drugs possessing predominant *Katu* (pungent) and *Kashaya* (astringent) tastes, as milk helps moderate their *Teekshna* (sharp) nature and improves palatability. The present review aims to elucidate the pharmaceutical principles, preparation methods, and therapeutic significance of *Ksheerapaka* as described in Ayurvedic literature.

Methods: A review of classical Ayurvedic texts was conducted to collect and analyze information related to *Ksheerapaka Kalpana*. Various methods of preparation, including the proportions of drug, milk, and water described in the literature, were examined. The pharmaceutical procedures involved in the preparation and the rationale behind the use of milk as an extraction medium were evaluated.

Results: Classical Ayurvedic texts describe multiple methods for the preparation of *Ksheerapaka* using different proportions of drug, milk, and water. In all methods, the ingredients are subjected to mild heating until the volume is reduced to the initial quantity of milk. This process facilitates the extraction and concentration of active constituents within the milk medium. The use of milk not only enhances extraction but also masks undesirable taste attributes, improves patient acceptability, and contributes additional therapeutic benefits due to its *Madhura Rasa* (sweet taste) and *Madhura Vipaka* (sweet post-digestive effect).

Conclusion: *Ksheerapaka* represents a pharmaceutically and therapeutically significant Ayurvedic dosage form that combines the extraction efficiency of milk with its nutritive and rejuvenative properties. By improving palatability, moderating the intensity of certain drugs, and enhancing therapeutic efficacy, *Ksheerapaka* remains an important formulation in Ayurvedic pharmaceuticals. Further scientific evaluation may help establish its relevance in contemporary healthcare and drug delivery systems.

Keywords: *Ksheerapaka*; Herbal Milk Decoction; Pharmaceutical Processing; Pharmacotherapeutics

1. Introduction

Ayurvedic pharmaceuticals (*Bhaishajya Kalpana*) encompasses a wide range of dosage forms designed to optimize therapeutic efficacy, patient compliance, stability, and route of administration. These formulations are broadly classified into primary preparations, such as *Swarasa* (fresh juice), *Kalka* (paste), *Kwatha* (decoction), *Hima* (cold infusion), and

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Phanta (hot infusion), and secondary preparations, including *Vati* (tablets), *Avaleha* (lickable preparations), *Sneha Kalpana* (oleaginous formulations), and *Sandhana Kalpana* (fermented formulations). Among these, *Ksheerapaka* is a distinctive milk-based pharmaceutical preparation described under the *Upakalpana* (subsidiary preparations) of *Kwatha Kalpana*.

References to *Ksheerapaka* are extensively documented in classical Ayurvedic texts, including both the *Brihatrayi* and *Laghutrayi*. In this formulation, milk serves as the principal extraction medium, facilitating the extraction of therapeutically active constituents while simultaneously imparting its nutritive and rejuvenative properties. *Ksheerapaka* is particularly indicated for herbal drugs possessing predominant *Katu* (pungent) and *Kashaya* (astringent) *rasa*, where milk enhances palatability, mitigates undesirable taste attributes, and improves patient acceptability.

A classical example is *Arjuna Ksheerapaka*, prepared using the bark of *Terminalia arjuna*, which is widely employed for its cardioprotective properties. The inherent *Kashaya rasa* of *Arjuna* may limit its palatability; however, incorporation of milk improves its organoleptic characteristics while providing additional nutritional benefits. Similarly, *Bhallataka Ksheerapaka*, prepared from *Semecarpus anacardium*, demonstrates the utility of milk in moderating the *Ushna* (hot) and *Tikshna* (sharp) properties of the drug. Although *Bhallataka* possesses significant therapeutic potential, including *Krimighna* (anthelmintic), *Arshoghna* (anti-haemorrhoidal), *Kushthaghna* (anti-dermatotic), and *Shoolaghna* (analgesic) actions, its administration may be associated with adverse effects in individuals with Pitta-predominant constitution or heightened sensitivity. In such cases, the use of milk as a processing medium helps reduce irritant effects and enhances tolerability.

Generally, substances possessing *Amla* (sour) and *Lavana* (salty) *rasa* are not preferred for *Ksheerapaka* preparation due to their incompatibility with the milk medium. Classical Ayurvedic literature predominantly advocates the use of cow's milk (*Goksheera*), owing to its *Jeevaniya* (life-promoting), *Brimhana* (nourishing), and *Rasayana* (rejuvenative) properties [1]. Thus, *Ksheerapaka* represents a unique pharmaceutical approach that combines the therapeutic attributes of medicinal plants with the nutritional and bio-enhancing properties of milk, resulting in a formulation of considerable pharmaceutico-therapeutic significance.

2. Materials and Methods

2.1. Apparatus Required

The apparatus required for the preparation of *Ksheerapaka* includes a mortar and pestle for size reduction of the raw drug, a stainless-steel vessel for heating, a ladle for stirring, a measuring jar for volumetric measurements, a filter cloth or sieve for filtration, and an appropriate heat source to maintain controlled heating conditions.

2.2. General method of preparation

According to classical Ayurvedic literature, *Ksheerapaka* is prepared by processing one part of the medicinal drug with specified proportions of milk and water. The mixture is heated gently until the aqueous portion evaporates and the volume is reduced to the original quantity of milk (*Ksheeravashsha*). This process facilitates the extraction of both water-soluble and milk-soluble phytoconstituents while simultaneously incorporating the nutritive properties of milk into the formulation.

2.3. Proportions of Drug, Milk, and Water in *Ksheerapaka* According to Classical Ayurvedic Literature

1. According to *Sharangadhara Samhita*, *Ksheerapaka* is prepared by combining the medicinal drug, milk, and water in the ratio of 1:8:32, respectively [2]. The mixture is subjected to mild heating (*Mandagni*) until the volume is reduced to the initial quantity of milk (*Ksheeravashsha*). The resulting preparation is then filtered to remove the residual drug particles and administered in a lukewarm state.

Kṣīram aṣṭaguṇam dravyāt kṣīranīram caturguṇam ।

Kṣīrāvaśeṣam tatpitaṁ śūlamāmodbhavaṁ jayet ॥

(*Śārṅgadhara Saṃhitā, Madhyama Khaṇḍa 2/161*)

2 According to *Yadavji Trikamji Acharya*, *Ksheerapaka* is prepared using drug, milk, and water in the ratio of 1:15:15 [3]. The mixture is boiled until the volume is reduced to the initial quantity of milk, followed by filtration of the preparation prior to administration.

Kṣīraṃ tithiguṇaṃ dravyāt kṣīranīraṃ samaṃ matam ।

Kṣīrāvaśeṣaṃ tat pitam kṣīrapāke tvayaṃ vidhiḥ ॥

(Dravyagūṇa Vijñāna, 2/36–37)

3 According to *Vṛddha Vāgbhaṭa*, initially, a decoction of the medicinal drug is prepared using water as the extraction medium. An equal quantity of milk is then added to the decoction and boiled until the volume is reduced to the original quantity of milk (*Ksheeravashesa*)[4], following which the preparation is filtered and administered.

Kṣīrādi-sahitaṃ cha dravyaṃ na samyag uktarasam bhavati iti vāri-kvātha-pūrvakam ।

Kṣīrādyastad upadeśe anupadagdham kvāthayet ॥

(Aṣṭāṅga Saṅgraha, Kalpasthāna 8/12)

Vṛddha Vāgbhaṭa opines that direct processing of medicinal drugs in milk may not ensure complete extraction of their active constituents. Hence, a decoction is first prepared using water as the extraction medium, after which the prescribed quantity of milk is added and the mixture is further boiled to obtain the *Ksheerapaka*.

Table 1 Comparative Proportions of Drug, Milk, and Water Described for *Ksheerapaka* Preparation in Classical Ayurvedic Texts

Sl no	Author	Ratios			Reduction
		Drug	Milk	Water	
1	<i>Sharangadhara</i>	1	8	32	Till milk part remains
2	<i>Yadavji Trikamji Acharya</i>	1	15	15	Till milk part remains
3	<i>Vṛddha Vāgbhaṭa</i> advocates the initial preparation of a decoction (<i>Kashaya</i>) using water as the extraction medium. Thereafter, an equal quantity of milk is added to the decoction and the mixture is reheated until reduced to the original volume of milk.				

2.4. Precautions During the Preparation of *Ksheerapaka*

The following precautions should be observed during the preparation of *Ksheerapaka* to ensure product quality and uniformity:

- The raw drug should be processed into a coarse powder prior to preparation to facilitate optimal extraction of active constituents.
- The formulation should be prepared under mild and controlled heating conditions (*Mandagni*) throughout the process.
- Continuous or intermittent stirring should be maintained to prevent scorching of the drug material and charring, frothing, or overflow of the milk.
- A wide-mouthed vessel is preferred to facilitate uniform heating and to minimize the risk of spillage during boiling.
- As classical Ayurvedic texts do not describe specific confirmatory tests for determining the endpoint of *Ksheerapaka* preparation, the initial volume of milk should be carefully measured before commencement of the process. Heating should be continued until the final volume is reduced to the original quantity of milk (*Ksheeravashesa*).

2.5. Significance of Ksheerapaka

Ksheerapaka is a unique Ayurvedic dosage form that offers several pharmaceutical and therapeutic advantages:

- The use of milk as the processing medium improves the palatability of medicinal drugs by masking undesirable tastes, particularly *Katu* (pungent) and *Kashaya* (astringent) *rasa*, thereby enhancing patient compliance.
- *Ksheerapaka* is extensively employed in the management of various disease conditions, including *Jwara* (fever), *Raktapitta* (hemorrhagic disorders), *Gulma* (abdominal masses), and *Agnimandya* (impaired digestive function).
- Owing to the *Sheeta* (cooling), *Brimhana* (nourishing), and *Pittashamaka* properties of milk, *Ksheerapaka* is particularly beneficial in individuals with *Pitta*-predominant constitution and in disorders associated with *Pitta* aggravation.
- Milk serves as an effective processing medium for *Tikshna* (potent) and *Ushna* (hot) drugs, such as *Bhallataka* (*Semecarpus anacardium*), helping to mitigate their irritant and potentially adverse effects while preserving their therapeutic efficacy.
- In addition to facilitating drug delivery, milk contributes significant nutritional value due to its rich content of proteins, fats, minerals, and calcium, thereby supporting overall nourishment and tissue replenishment.
- The presence of milk fat in a colloidal state may contribute to prolonged gastrointestinal residence time and sustained release of bioactive constituents, potentially enhancing the duration of therapeutic action of the formulation.

2.6. Dosage

Classical Ayurvedic texts do not explicitly specify a standard dosage for *Ksheerapaka*. Therefore, the dosage prescribed for *Kwatha Kalpana* is generally adopted, which is approximately 2 *Pala* (96 mL). However, the dose should be individualized based on factors such as the nature and severity of the disease (*Roga Bala*), the strength and constitution of the patient (*Rogi Bala*), age, digestive capacity, and overall clinical condition.

2.7. Adjuvant

Ksheerapaka may be administered along with suitable adjuvants (*Anupana*) such as sugar candy (*Sharkara*) or honey (*Madhu*) to enhance palatability and therapeutic efficacy. The selection of the adjuvant may be based on the nature of the formulation, disease condition, and individual patient requirements.

2.8. Shelf life

Ksheerapaka is a freshly prepared formulation intended for immediate consumption. Owing to the presence of milk and the absence of preservatives, it is generally recommended to be administered soon after preparation and is not intended for prolonged storage.

3. Discussion

Ksheerapaka is a unique Ayurvedic pharmaceutical preparation that shares several similarities with *Kwatha Kalpana* in terms of its method of preparation. However, unlike *Kwatha*, where water serves as the sole extraction medium, *Ksheerapaka* utilizes both water and milk, thereby facilitating the extraction of a broader spectrum of phytoconstituents. The incorporation of milk not only enhances the extraction process but also imparts its own nutritive and therapeutic properties to the formulation.

The use of milk as a processing medium is of particular significance in Ayurveda. Besides improving the palatability of formulations containing predominantly *Katu* (pungent) and *Kashaya* (astringent) drugs, milk helps mitigate the *Ushna* (hot) and *Tikshna* (sharp) properties of certain medicinal substances. Consequently, *Ksheerapaka* is especially useful for administering potent drugs such as *Bhallataka* and for managing disorders associated with *Pitta* predominance. Furthermore, the sweet taste and nourishing attributes of milk contribute to improved patient acceptability and therapeutic compliance.

From a nutritional perspective, milk is regarded in Ayurveda as a *Jeevaniya* (life-promoting) substance and is considered a wholesome food. It provides essential nutrients, including proteins, fats, carbohydrates, vitamins, and minerals, which may contribute to the overall nourishing and restorative effects of the formulation. Thus, *Ksheerapaka* represents a

dosage form that combines both therapeutic and nutritional benefits, distinguishing it from many other Ayurvedic preparations.

Despite its advantages, *Ksheerapaka* has certain limitations. Owing to the presence of milk and the absence of preservatives, the preparation possesses a limited shelf life and is therefore intended for immediate consumption, preferably in a lukewarm state. Although the dosage generally follows the recommendations for *Kwatha Kalpana*, it should be individualized based on factors such as disease severity (*Roga Bala*), patient strength (*Rogi Bala*), age, and digestive capacity. Additionally, substances possessing *Amla* (sour) and *Lavana* (salty) properties are generally avoided in *Ksheerapaka* preparation due to their potential to destabilize or curdle the milk medium.

Classical Ayurvedic texts describe variations in the proportions of drug, milk, and water employed in the preparation of *Ksheerapaka*. While these methods are traditionally accepted, there is a paucity of comparative scientific studies evaluating their pharmaceutical characteristics and therapeutic outcomes. Therefore, further experimental and clinical investigations are warranted to identify the most effective method of preparation and to establish standardized protocols for the formulation of *Ksheerapaka*.

4. Conclusion

Ksheerapaka is a distinctive milk-based dosage form described in Ayurvedic pharmaceuticals, wherein both milk and water serve as extraction media for the therapeutic constituents of medicinal drugs. This formulation not only facilitates the extraction of bioactive compounds but also incorporates the nutritive and rejuvenative properties of milk. *Ksheerapaka* is particularly beneficial for processing drugs possessing *Ushna* (hot) and *Tikshna* (sharp) properties, as the milk medium helps moderate their intensity and improve tolerability. Furthermore, the formulation enhances palatability and patient acceptability by masking undesirable tastes, thereby promoting better therapeutic compliance. Owing to its combined pharmaceutical, nutritional, and therapeutic advantages, *Ksheerapaka* occupies a unique and significant position among classical Ayurvedic dosage forms.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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