

Khar: The Indigenous Alkaline Heritage of Assam

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Abstract

Khar is a traditional alkaline extract central to Assamese cuisine, medicine, and sericulture, historically serving as a salt substitute and cultural identity marker reflected in the phrase “*Khar khuwa Asomiya*”. This ethnographic and analytical study examined traditional preparation techniques, source diversity, and applications of khar across 15 villages in Nalbari, Bajali, Bongaigaon, and Kokrajhar districts of Lower Assam. Simple random sampling documented 11 natural sources, including *Musa* spp., *Eichhornia crassipes*, *Carica papaya*, etc., and cow urine, yielding variants such as *Dokhla Khar* and *Jo'-Khar Khar*. pH analysis of field-collected samples showed marked alkalinity, with stored Khar ranging from pH 9.5–11.5 and freshly prepared Khar from pH 7.7–9.5, confirming traditional claims of increased potency upon storage. Khar's roles as a natural antacid, febrifuge, preservative, and silk degumming agent highlight its ethnomedicinal, nutritional, and eco-friendly industrial significance.

Keywords: Khar, Assamese community, *Jo'-Khar Poti*, ethnomedicine, culinary heritage.

1. Introduction

Traditional food systems represent an important interface between culture, ecology, nutrition, and indigenous knowledge. Across North-East India, several food practices continue to preserve historical adaptations to environmental and socio-economic conditions. Among these, Khar occupies a unique position in Assamese society as both a culinary ingredient and a traditional alkaline preparation with ethnomedicinal and industrial significance. Khar is widely regarded as one of the defining elements of Assamese identity and is reflected in the popular expression “*Khar khuwa Asomiya*” (Khar-consuming Assamese), symbolizing the deep cultural association of Assamese communities with this traditional preparation.

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Khar is a natural alkaline extract traditionally prepared by filtering water through the ash obtained from selected plant materials. Although several botanical sources are used, the most recognized and widely accepted form is Kola Khar, prepared from the ash of different parts of *Musa balbisiana*, locally known as Bhim Kol or Athiya Kol, particularly the stem, rhizome, and fruit peel. In addition to banana-based preparations, local communities across Assam prepare Khar from multiple plant species and organic sources depending on regional availability and household traditions. The preparation of Khar reflects a well-developed indigenous knowledge system transmitted across generations. Historically, Khar played a critical role in the food security and survival strategies of Assamese communities. Before widespread accessibility of commercial salt, particularly during periods of colonial regulation and economic hardship, Khar functioned as an important alternative seasoning agent in rural households. Salt scarcity in Assam was intensified by geographic isolation, transportation difficulties, and colonial taxation policies under British administration, making sodium chloride expensive and inaccessible for economically disadvantaged populations. In such circumstances, locally prepared alkaline extracts emerged as affordable substitutes that fulfilled culinary and, to some extent, mineral requirements. The dependence on Khar illustrates how indigenous communities adapted dietary practices to local environmental conditions and resource limitations (Pradhan, 2025).

Chemically, Khar differs from conventional table salt because it contains predominantly alkaline mineral components, especially potassium carbonate rather than sodium chloride. This mineral composition contributes to its characteristic salty, smoky, and mildly astringent taste profile while also influencing its functional properties in cooking and preservation (Pradhan, 2025). Traditionally, Khar has been valued for its ability to soften vegetables and pulses, reduce cooking time, improve digestibility, and enhance flavour. In Assamese cuisine, Khar is not merely an ingredient but also represents an entire category of dishes. Beyond culinary applications, Khar possesses considerable ethnomedicinal importance. Traditional communities have long employed Khar as a natural antacid for managing gastric acidity, indigestion, seasonal digestive disorders, and helminthic infections. Previous reports have also documented the use of Khar in traditional remedies for common colds, wound management, and maintenance of digestive health. The high alkalinity of Khar is further believed to contribute to antimicrobial activity and preservation of food products (Hemanta *et al.*, 2014; Barman *et al.*, 2023).

The significance of Khar extends beyond food and medicine into traditional cottage industries, particularly sericulture. Due to its alkaline properties, Khar serves as a natural degumming agent during silk processing (Choudhury *et al.*, 2016). The alkaline solution facilitates the denaturation and removal of sericin from silk cocoons, thereby easing fibre extraction. This indigenous practice offers an environmentally sustainable alternative to synthetic chemical degumming processes and demonstrates the broader technological applications of traditional knowledge systems.

Despite its long-standing cultural and functional importance, systematic documentation of Khar diversity, preparation techniques, and contemporary applications remains limited. Existing studies have primarily focused on selected forms of Kola Khar, while regional variations and associated ethnographic knowledge continue to receive comparatively little scientific attention. Therefore, the present study was undertaken to document the traditional preparation methods, identify the diversity

of natural sources used for Khar production, analyse its alkalinity, and evaluate its culinary, medicinal, and sericultural applications across selected districts of Lower Assam. By integrating ethnographic observations with analytical assessment, the study aims to contribute toward preserving indigenous knowledge and highlighting the contemporary relevance of this unique traditional alkaline resource.

2. Methodology

2.1. Study area

The present investigation was carried out in Lower Assam, India, covering four districts: Nalbari, Bajali, Kokrajhar, and Bongaigaon. A total of 15 villages were selected across these districts to document the traditional preparation and uses of Khar. The selection of villages was done to represent diverse ethnic communities and rural households where Khar preparation is widely practiced. A random sampling approach was adopted for the survey. This can be described as simple random sampling within purposively selected villages. Information was collected from respondents, regardless of age or gender, provided they had knowledge or experience with Khar preparation.

2.2. Data collection

Primary data were collected through semi-structured interviews and direct observation of the preparation process. Information was documented on the raw materials used for Khar preparation. Traditional preparation techniques, drying, burning, ash collection, filtration, and storage methods were recorded in detail. Additionally, the diverse applications of Khar in culinary practices, ethnomedicine, and sericulture were documented based on respondent knowledge.

2.3. pH analysis

Khar samples were collected directly from the households in clean, airtight containers. Both freshly prepared and stored Khar samples were included to compare alkalinity levels. The pH of each Khar sample was measured immediately by a calibrated digital pH meter to prevent alteration and confirm the alkaline nature of Khar traditionally prepared from different biological sources.

3. Results

3.1. Sources of Khar

The study documented different natural products commonly used in the preparation of Khar. These include *Musa* spp., *Eichhornia crassipes*, *Vigna mungo*, *Sesamum indicum*, *Hibiscus sabdariffa*, *Carica papaya*, *Cocos nucifera*, and Cow urine. Various parts such as peels, stems, culm, whole plant, etc. are utilized for the preparation of Khar, contributing to its unique flavour and characteristics.

Table 1: Natural sources used for Khar preparation

Sl No.	Vernacular Name (Assamese)	Scientific Name	Part used	pH (freshly prepared)	pH (stored)
1	Bheem Kol	<i>Musa balbisiana</i>	Stem, culm	8.5	11.5
2	Manohar Kol	<i>Musa sapientum</i>	Stem, culm	8.5	11.5
3	Seni-Champa Kol	<i>Musa paradisiaca</i>	Stem, culm	8.3	11.5

4	Pani-Meteka (Dokhla Khar)	<i>Eichhornia crassipes</i>	Whole plant	7.7	9.8
5	Deshi-Meteka (Dokhla Khar)	<i>Monochoria hastata</i>	Whole plant	7.6	9.5
6	Amita	<i>Carica papaya</i>	Culm	8.0	11.5
7	Narikol	<i>Cocos nucifera</i>	Husk, exterior shell of the fruit	8.8	9.8
8	Matimaah	<i>Vigna mungo</i>	Whole stem, pulses	8.5	10.8
9	Soriyoh	<i>Sesamum indicum</i>	Whole stem, pulses	8.4	10
10	Mesta-tenga	<i>Hibiscus sabddariffa</i>	Whole stem	8.3	10.5
11	Goru (Jo'-Khar Khar)	<i>Bos indicus</i>	Urine	9.5	11.5

3.2. Traditional Preparation Methods

The preparation method of plant-based Khar was found to be largely uniform across the study area with only minor variations. The optimal time for Khar preparation is typically in late summer to autumn (September-October). (Assamese: Aahin-Kati Maah). Selected plant parts were thoroughly cleaned, sliced into small pieces, and sun-dried for 15–20 days until completely moisture-free. The dried material was subsequently burnt to ash, and the resulting ash was carefully collected. This ash was mixed with water and allowed to settle for approximately three to five hours, after which the supernatant was filtered through a clean cotton cloth. The clear filtrate obtained through this process is locally termed Khar. For storage, Khar was kept in earthen pots with airtight lids. It is a traditional belief among local communities that the longer the Khar is stored, the more concentrated and alkaline it becomes. During use, the stock Khar is diluted with water according to specific requirements.

The preparation of Jo'-Khar Khar involved the use of cow urine as the primary raw material. Fresh cow urine was collected and stored in earthen pots for several days to weeks under ambient conditions. During storage, a thick layer gradually formed on the surface of the urine, which was carefully collected. This layer was then mixed with a small quantity of fresh cow urine and water, and the mixture was boiled until a thick, concentrated liquid was obtained. The resulting liquid was filtered, stored in appropriate containers, and diluted with water before use.

3.3. Applications of Khar

Based on respondent interviews, three major domains of Khar application were identified in traditional Assamese society.

3.3.1. Medicinal Importance

Khar has been traditionally employed as a natural antacid to neutralize stomach acidity and treat various digestive disorders, including gastric issues, helminthic infections, and seasonal stomach ailments. Jo'-Khar Khar holds specific ethnomedicinal significance in the management of high fever. In this practice, a piece of soft cotton cloth is soaked in Jo'-Khar Khar and applied to the forehead of the patient, a traditional therapeutic method locally known as Jo'-Khar Pati.

3.3.2. Culinary Importance

In Assamese cuisine, Khar imparts a characteristic salty and astringent flavour to dishes, and preparations made with Khar are commonly referred to as *Kharor Anja* (A diluted gravy having Khar), *Kharor Sabji* (A curry having Khar), *Khar Dail/Dali* (Lentil curry with Khar), and *Kharor Torkari* (Vegetable curry with Khar). Historically, Khar served as a substitute for table salt in rural households during the colonial period. Beyond taste, it reduces cooking time by softening vegetables and pulses, improves digestibility, and helps in maintaining body pH. As a natural source of potassium carbonate, Khar also functions as a mineral supplement. Due to its high alkalinity, it acts as a natural preservative to extend the shelf life of food. The deep cultural significance of Khar is encapsulated in the Assamese identity phrase “*Khar khuwa Asomiya*”, meaning “Khar-consuming Assamese”.

3.3.3. Sericulture Sector

Khar plays a crucial role in traditional sericulture owing to its alkaline nature. It is used as a natural degumming agent in silk processing, where it denatures the sericin protein present in silk cocoons. This action loosens the cocoons and facilitates the separation of fibroin from sericin, thereby making silk fibre extraction easier. In practice, cocoons are boiled in Khar-mixed water, representing an eco-friendly and herbal approach to degumming that avoids synthetic chemicals.

4. Discussion

The present study documents the traditional preparation, source diversity, and multipurpose applications of Khar across selected villages of Lower Assam and demonstrates that Khar continues to remain an important component of indigenous food systems, ethnomedicine, and rural household practices. The findings indicate that Khar is not a single standardized product but rather a diverse category of alkaline preparations produced from multiple plant and animal sources according to local availability, household traditions, and intended use.

A total of eleven natural sources of Khar preparation were recorded in the study area, viz. *Musa balbisiana*, *Musa sapientum*, *Musa paradisiaca*, *Eichhornia crassipes*, *Monochoria hastata*, *Carica papaya*, *Cocos nucifera*, *Vigna mungo*, *Sesamum indicum*, *Hibiscus sabdariffa*, and the urine of *Bos indicus*. Among these, banana-based Khar preparations, particularly those derived from *Musa balbisiana*, were the most culturally valued and frequently cited by respondents, supporting earlier observations that Bhim Kol produces superior-quality Kola Khar and remains deeply embedded in Assamese culinary traditions (Sarma *et al.*, 2020). The presence of multiple botanical sources also demonstrates a strong adaptive relationship between traditional food practices and locally available biological resources. Although the source materials varied, the overall preparation procedure remained remarkably consistent throughout the study area, suggesting a stable and well-preserved indigenous technological knowledge system.

The preparation process observed during the study- sun drying, ash production, aqueous extraction, sedimentation, filtration, and storage- reflects a traditional alkaline extraction technique developed through empirical understanding accumulated across generations. The preference for preparation during the Aahin–Kati Maah (September–October) may be associated with environmental conditions favorable for efficient drying and preservation of raw materials. Such seasonal synchronization suggests that

Khar preparation is not merely culinary but also integrated into local ecological calendars and resource management practices.

One of the major findings of the present investigation was the marked alkalinity of Khar samples collected from the field. Freshly prepared Khar exhibited pH values ranging from 7.7–9.5, whereas stored Khar showed considerably higher alkalinity ranging from pH 9.5–11.5. These observations provide analytical support for the traditional belief that Khar becomes stronger and more concentrated upon prolonged storage. The increase in alkalinity during storage may result from progressive concentration through evaporation, continued dissolution of alkaline salts, or stabilization of soluble mineral fractions. Although detailed chemical characterization was beyond the scope of the present study, the findings strongly indicate that storage conditions influence the physicochemical properties of Khar and may affect its culinary and medicinal effectiveness.

The observed alkaline nature of Khar also provides a scientific basis for several traditional applications reported by local communities. High alkalinity facilitates the softening of plant tissues and pulse seed coats, reducing cooking time and improving texture. Similarly, alkaline conditions may explain the widespread use of Khar as a digestive aid and natural antacid in local healthcare systems. Community reports of Khar use against gastric disturbances, seasonal digestive problems, and helminthic conditions correspond with previous documentation of its medicinal significance (Saikia *et al.*, 2013; Hemanta *et al.*, 2014). The specific use of *Jo'-Khar* Khar in fever management through the practice of *Jo'-Khar Pati* highlights the persistence of localized therapeutic traditions that continue to operate alongside modern healthcare systems.

The findings of the present study are consistent with the observations of Barman *et al.* (2023), who documented the preparation process of Kola Khar and emphasized its broad applications in culinary practices, folk medicine, and traditional healthcare systems. Their discussion also connected Khar with the Ayurvedic concept of *Kshara*, where alkaline preparations are considered therapeutically important because of their *Chedana* (excision), *Bhedana* (penetrating action), *Lekhana* (scraping action), and *Tridosha hara* (balancing the three doshas) properties. Classical Ayurvedic texts describe multiple forms of *Kshara*, including *Pratisaraneeya Kshara*, *Paneeya Kshara*, *Kshara sutra*, *Kshara varti*, *Kshara avaleha*, and *Kshara gutika*, reflecting the broad medicinal applications of alkaline formulations. *Paneeya Kshara* has traditionally been reported for managing conditions such as *Gulma* (abdominal mass), *Udara* (ascites), *Shankara*, *Ashmari* (calculi), *Abhyantara vidradhi*, *Krimi*, and *Arsha* without invasive procedures (Arakeri *et al.*, 2023). Although the present study did not clinically evaluate therapeutic efficacy, the continued household use of Khar in Lower Assam suggests that such traditional medical concepts remain influential in shaping contemporary community practices.

Apart from food and medicine, the study further demonstrates the industrial relevance of Khar in traditional sericulture. Respondents consistently reported the use of Khar as a degumming agent during silk processing, where cocoons are boiled in alkaline Khar solutions to facilitate separation of fibroin from sericin. This observation aligns with the findings of Choudhury *et al.* (2016), who explored alternative natural degumming agents including Kola-Khar, elephant apple, and lemon and compared them with conventional sodium carbonate methods. The agreement between the

present observations and previous studies indicates that Khar possesses practical utility as an eco-friendly degumming agent that may reduce dependence on synthetic chemicals and support sustainable sericulture practices.

Historically, Khar emerged as an adaptive response to environmental and economic conditions in Assam, particularly during periods of restricted access to commercial salt. The traditional use of alkaline extracts as salt substitutes demonstrates how indigenous communities developed locally available alternatives to meet culinary and physiological needs. Even though commercial salt is now universally accessible, Khar continues to persist because its value extends beyond seasoning to include digestibility enhancement, food preservation, medicinal use, and cultural identity.

Overall, the findings emphasize that Khar represents more than a culinary additive; it embodies a complex indigenous knowledge system integrating food technology, traditional medicine, ecological adaptation, and sustainable household practices. The persistence of Khar preparation and utilization across Lower Assam highlights the resilience of local knowledge and underscores the importance of documenting and scientifically evaluating traditional alkaline preparations before these practices undergo further transformation under modernization.

5. Conclusion

The present study demonstrates that Khar is far more than a traditional culinary ingredient; it represents a dynamic indigenous knowledge system integrating food culture, ethnomedicine, household technology, and sustainable resource utilization in Assam. Documentation of eleven natural sources and the largely uniform preparation method across Lower Assam highlights both the diversity and continuity of this traditional practice. The observed alkaline nature of Khar, particularly the higher pH of stored preparations (9.5–11.5), provides scientific support for local beliefs regarding increased potency with storage and helps explain its wide applications in cooking, digestion, preservation, and sericulture. The continued use of Khar in contemporary Assamese society despite the availability of modern alternatives reflects its enduring cultural and functional significance. Therefore, preserving and scientifically validating such traditional practices is essential not only for safeguarding indigenous heritage but also for exploring their potential contributions to sustainable food systems, traditional healthcare, and eco-friendly industrial applications.

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