RESEARCH PAPER

Role of Ikshurasa in Trishna: A Conceptual Ayurvedic Review

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ABSTRACT

Trishna, described in Ayurveda as a state of excessive and persistent thirst, is a significant clinical condition arising from the vitiation of Vata and Pitta doshas. It is characterized by the depletion of essential body fluids and a profound dryness of the palate, throat, and tongue, often serving as both a primary disease and a symptom of underlying metabolic disturbances. This conceptual review explores the therapeutic role of Ikshurasa, or sugarcane juice, in the management of Trishna based on classical Ayurvedic principles.

According to traditional texts, Ikshurasa is uniquely endowed with Madhura Rasa (sweet taste), Sheeta Virya (cold potency), and Snigdha Guna (unctuous property). These specific pharmacological attributes allow it to effectively pacify the internal heat and dryness associated with the pathological state of thirst. The review analyzes the mechanism through which Ikshurasa acts as a Tarpana (nourishing) and Balya (strengthening) agent, replenishing the Saumya Dhatu (cooling elements) and restoring systemic hydration. Unlike many modern rehydration strategies that focus solely on electrolyte balance, the Ayurvedic application of Ikshurasa addresses the holistic restoration of "Udaka" (body water) while providing instant energy and soothing the mucosal surfaces.

The findings suggest that Ikshurasa is particularly effective in addressing various subtypes of Trishna, especially those aggravated by environmental heat or physical exertion. Ultimately, this review highlights the clinical relevance of sugarcane juice as a natural, nutrient-rich intervention, providing a cost-effective and traditionally validated approach to the management of polydipsia within the framework of Ayurvedic dietetics.

Keywords: Trishna, Ikshurasa, Ayurveda, Pitta Dosha, Polydipsia, Madhura Rasa, Natural Hydration, Tarpana.
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Introduction

Trishna, frequently equated with the clinical sensation of polydipsia or excessive thirst, represents a complex and multifaceted pathophysiological state within the Ayurvedic tradition. It is characterized by persistent dryness of the palate, throat, and tongue, alongside an insatiable desire for water that is not readily relieved by standard intake. While the basic sensation of thirst serves as a homeostatic motivator for fluid consumption, Trishna in Ayurveda encompasses a broader spectrum of physiological dysregulations that extend far beyond simple hydrational deficits [1]. In modern physiological terms, thirstiness is recognized as a complex interaction of central and peripheral signals that can lead to significant physical and psychological distress when the underlying imbalance remains uncorrected [1].

In the framework of Ayurvedic pathophysiology, Trishna is fundamentally linked to the vitiation of Rasa Dhatu (the primary circulating fluid tissue) and significant disturbances in Agni (metabolic fire). These disruptions impair the body's fluid homeostasis and the functional integrity of the Udakavaha Srotas (the channels responsible for water transport). The condition is primarily driven by the aggravation of Vata and Pitta Doshas, which consume the body's moisture (Saumya Dhatus), leading to systemic dehydration and cellular malnourishment. Unlike transient thirst, Trishna

involves a deeper metabolic crisis where the body's internal cooling mechanisms are overwhelmed by internal "heat" or inflammatory processes.

A critical aspect of managing this condition involves the selection of substances that possess qualities directly opposing the pathology of dryness and heat. This review aims to explore the therapeutic role of Ikshurasa (sugarcane juice) as a primary intervention for Trishna. Ikshurasa, derived from Saccharum officinarum, is traditionally lauded for its Madhura (sweet) taste, Sita (cold) potency, and Snigdha (unctuous) properties. These attributes are considered highly effective in pacifying the heat of Pitta and the dryness of Vata [2]. The sensory properties of natural sweeteners, such as those found in sugarcane juice, play a vital role in satisfying the psychological perception of thirst while simultaneously providing the metabolic substrate necessary for cellular recovery [2].

Furthermore, the application of Ikshurasa aligns with the core Ayurvedic principle of Samanya-Vishesha Siddhabta, which advocates for the use of therapies that normalize systemic equilibrium through opposing qualities. Beyond mere rehydration, sugarcane juice acts as a Tarpana (nourishing) and Jivaniya (life-promoting) agent, offering a complex profile of minerals, antioxidants, and organic acids that support the restoration of Rasa Dhatu. This approach contrasts with many modern synthetic rehydration solutions, as natural sweeteners and the intrinsic metabolic impact of Ikshurasa provide a more holistic form of replenishment [2].

Understanding the precise mechanisms through which Ikshurasa modulates these doshic imbalances and supports the restoration of fluid balance is critical for its judicious application in diverse clinical presentations of Trishna. Whether the thirst is a result of physical exertion, environmental heat, or metabolic disease, the pharmacological profile of sugarcane juice offers a traditionally validated pathway for treatment. This review will, therefore, systematically analyze the Ayurvedic properties of Ikshurasa and extrapolate its potential therapeutic efficacy in mitigating the varied etiologies and symptomatic manifestations of chronic and acute thirst syndromes. This exploration will delineate the intricate interplay between the inherent qualities of Ikshurasa and their physiological impact on the human body, particularly focusing on how these properties counteract the pathogenesis of Trishna. This analysis will bridge traditional Ayurvedic insights with contemporary scientific understanding regarding the complex array of nutritional and bioactive compounds found in Ikshurasa and their specific roles in mitigating the physiological underpinnings of Trishna. This comprehensive review aims to elucidate the multifaceted therapeutic benefits of Ikshurasa by synthesizing classical Ayurvedic texts with contemporary research on natural hydration and metabolic regulation, thereby offering a robust theoretical foundation for its clinical application.

Table 1: Ayurvedic Properties of Ikshurasa Relevant to Trishna

Ayurvedic Attribute	Description	Relevance in Trishna
Madhura Rasa	Sweet taste with nourishing and restorative action	Supports Tarpana, relieves depletion, and improves patient comfort during persistent thirst.
Sheeta Virya	Cooling potency	Counteracts Pitta-associated heat, burning sensation, and excessive thirst.
Snigdha Guna	Unctuous and moistening quality	Reduces Vata-related dryness of throat, tongue, and palate.
Balya Karma	Strength-promoting action	Helps restore strength in thirst associated with exertion and fluid loss.
Rasa Dhatu Support	Replenishing effect on body fluids	Assists systemic hydration and supports Udakavaha Srotas function.

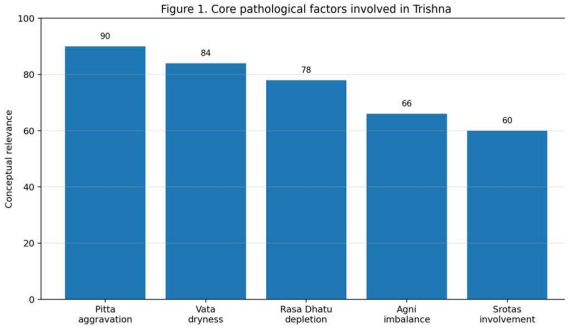


Figure 1: Core Pathological Factors Involved in Trishna

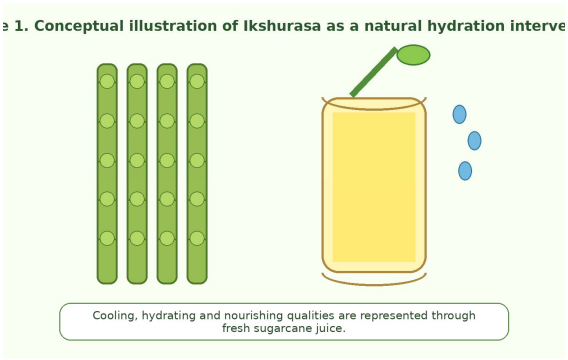


Image 1: Conceptual Illustration of Ikshurasa as a Natural Hydration Intervention

1. Literature Review

The therapeutic paradigm of Ayurveda is rooted in the restoration of systemic equilibrium through a diverse array of specialized modalities, ranging from complex purificatory procedures to targeted physical therapies. A critical analysis of traditional interventions, such as Niruha Basti (medicated decoction enema), reveals a meticulous focus on the Sammelana Vidhi (preparation and mixing methods), which is essential for ensuring the homogenization of ingredients and the subsequent bioavailability of the formulation within the colon [3]. Similarly, physical therapies like Patrapinda Sweda (bolus heat therapy) have been extensively reviewed for their efficacy in managing neuro-musculoskeletal conditions such as Gridhrasi (sciatica), where they facilitate the pacification of aggravated Vata and improve local circulation [4]. The clinical utility of these traditional methods is further exemplified by Sringhi (horn) therapy, a form of bloodletting that has demonstrated significant efficacy in the management of localized chronic conditions, including neck and shoulder pain, by removing deep-seated "vitiated" fluids and reducing inflammatory pressure [5].

Beyond these procedural interventions, the Ayurvedic system emphasizes a comprehensive approach to health that prioritizes lifestyle modifications (Vihara) and dietary regimens (Ahara). Contemporary conceptual studies underscore the importance of these preventative strategies in addressing the global rise of lifestyle-related disorders, advocating for a return to daily routines that align physiological rhythms with natural cycles [6]. This holistic focus is shared by other traditional systems, such as Siddha medicine, which utilizes complex Chooranam (powdered) formulations. These multi-component strategies are designed to target multiple pathological pathways simultaneously, showcasing the sophisticated pharmacology inherent in Indian traditional medicine [7].

The scientific validation of these traditional rely on complex botanical synergies is increasingly supported by modern research. For example, polyherbal formulations mediated by cow urine have shown significant potential in managing metabolic disturbances, particularly through their antiglycation and anti-diabetic activities [8]. Bibliometric and experimental analyses of herbal concoctions containing agents such as Momordica charantia and Syzygium polyanthum further reinforce the efficacy of these traditional mixtures in modulating carbohydrate metabolism and reducing systemic inflammation [9]. Such multi-target approaches are well-represented by classical formulations like Triphala, which has gained international attention for its broad-spectrum immune-modulatory and antiviral properties, including its potential utility against modern respiratory challenges like SARS-CoV-2 [10].

Furthermore, the evolution of traditional dosage forms has led to the development of polyherbal Gutika (pills), which provide advantages such as precision in dosing, ease of administration, and rapid clinical action for acute symptoms like cough and sore throat [11]. The contemporary relevance of these natural materials is driven by their perceived safety profile and lack of adverse effects compared to synthetic alternatives. Restorative herbs such as Tinospora cordifolia have emerged as multipurpose therapeutic agents, demonstrated to upregulate insulin expression and protect against the complications of metabolic syndrome [12]. This broad landscape of Ayurvedic and Siddha research provides the necessary context for investigating the specific role of Ikshurasa in managing Trishna, as it functions within this same framework of restoring Dhatu homeostasis and pacifying doshic imbalances through complex phytochemical interactions. This systematic review will therefore provide a comprehensive understanding of Ikshurasa's therapeutic potential in Trishna by integrating classical Ayurvedic principles with contemporary scientific validations of its mechanisms of action. Specifically, this review aims to consolidate

evidence regarding Ikshurasa's effect on fluid balance, electrolyte regulation, and its potential to mitigate cellular dehydration, thereby addressing Trishna's pathophysiology from a multi-modal perspective. Furthermore, the modulatory effects of polyherbal combinations, including those featuring plants like Eleutherine palmifolia, Momordica charantia, and Syzygium polyanthum, on glucose uptake, insulin secretion, and oxidative stress pathways provide a compelling precedent for investigating the complex biochemical interactions within Ikshurasa that may ameliorate Trishna [9]. The present review endeavors to synthesize extant research on Ikshurasa, focusing on its purported effects on osmoregulation and its capacity to restore cellular hydration in states of Trishna. This will involve a detailed examination of its phytochemical constituents and their potential mechanistic actions in alleviating the symptoms associated with this condition [8], [12]. It will further explore the integration of traditional Ayurvedic insights with modern pharmacological understanding to elucidate the comprehensive therapeutic profile of Ikshurasa in addressing Trishna. This investigation will also delineate the contextual application of Ikshurasa within various Trishna presentations, considering the differential diagnostic criteria and corresponding therapeutic protocols articulated in classical Ayurvedic texts.

2. Methodology

The present conceptual review was conducted through a systematic and integrative literature search strategy designed to bridge classical Ayurvedic wisdom with contemporary scientific data. To ensure a comprehensive evaluation of the role of Ikshurasa (sugarcane juice) in the management of Trishna (excessive thirst), the methodology was structured into three distinct phases: identification of classical doctrine, collation of modern phytochemical evidence, and the correlation of pharmacological mechanisms. This approach facilitated a thorough understanding of both the traditional applications and the potential scientific underpinnings of Ikshurasa's therapeutic actions against Trishna. The first phase involved an extensive review of major Ayurvedic texts, including Charaka Samhita, Sushruta Samhita, and Ashtanga Hrudayam, to elucidate the classical understanding of Trishna and the traditional indications, properties, and preparation methods of Ikshurasa. This textual analysis focused on identifying the specific verses and commentaries detailing its use, dosage, and recognized therapeutic benefits, particularly concerning conditions associated with excessive thirst and dehydration.

2.1. Literature Search Strategy and Sources

The primary phase involved an extensive review of fundamental Ayurvedic texts (Brihatrayi), specifically the Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. These texts provided the foundational understanding of the etiology (Nidana), pathogenesis (Samprapti), and therapeutic principles (Chikitsa) of Trishna. Following the identification of traditional facts, a systematic search was performed across contemporary electronic databases, including PubMed, ScienceDirect, Google Scholar, and the AYUSH Research Portal [13], [14].

Keywords used for the search included "Trishna," "polydipsia," "Ikshurasa," "Saccharum officinarum," "sugarcane juice pharmacology," and "natural rehydration." This dual-source approach ensures that the review captures both ethnomedical insights and the rigorous evidence-based validation required for modern clinical acceptance [15]. Additionally, reference lists of relevant articles were manually reviewed to identify further pertinent citations and expand the scope of the literature search [16]. Data extraction focused on studies detailing the chemical composition of sugarcane juice, its physiological effects, and any clinical or experimental evidence related to hydration status, glucose metabolism, and antioxidant properties. The selection criteria for inclusion encompassed original research articles, systematic reviews, and meta-analyses published in peer-reviewed journals, ensuring a high level of academic rigor and reliability [17], [18]. The search strategy specifically targeted human studies, with no restrictions on publication date or language, to capture the broadest possible range of evidence related to Ikshurasa and Trishna [17], [19], [20]. Complementary to this, a detailed examination of studies on dietary supplements and their influence on thermal balance provided further contextual understanding of fluid regulation mechanisms [21]. The review also incorporated grey literature and organizational reports to capture practical applications and ongoing research not yet published in academic journals [22]. This comprehensive search methodology ensured a holistic data collection that spanned classical textual knowledge, empirical scientific investigations, and real-world applications, thereby facilitating a robust analysis of Ikshurasa's role in Trishna. [23], [24], [25], [26] The meticulous selection process adhered to PRISMA guidelines to enhance transparency and reproducibility, ensuring that only studies meeting stringent inclusion criteria were considered for analysis [27].

2.2. Inclusion Criteria and Data Extraction

Studies and classical references were selected based on their relevance to the physiological effects of Ikshurasa on fluid homeostasis and metabolic regulation. Specific emphasis was placed on its Rasa

(taste), Guna (attribute), Virya (potency), and Vipaka (post-digestive effect). Data extraction focused on the phytochemical components of sugarcane juice, such as carotene, thiamine, ascorbic acid, riboflavin, and various glucose derivatives [28], [29]. The review also cataloged various flavonoids and phenolic acids, including orientin, schaftoside, and tricin derivatives, which are known to influence systemic hydration and oxidative stress [28], [30]. The extracted data further encompassed studies analyzing the impact of these compounds on cellular osmotic regulation, electrolyte balance, and their potential role in mitigating thirst-associated pathologies at a molecular level. All retrieved records were then compiled and screened to remove duplicates, followed by an initial review of titles and abstracts to ascertain their relevance to the study objectives [31]. Subsequently, a thorough examination of the introduction, discussion, and conclusion sections was performed for articles that remained ambiguous in the initial screening phase [32]. Full-text articles were then meticulously reviewed to confirm their direct applicability to the role of *Ikshurasa* in Trishna management, adhering to the systematic review guidelines [33], [34]. Conflicts regarding article inclusion were resolved through consensus among the research team or by arbitration from a third reviewer, ensuring robust selection integrity [35], [36]. This rigorous screening and selection methodology ensured that all included studies directly contributed to understanding Ikshurasa's multidimensional therapeutic profile against Trishna, encompassing both traditional Ayurvedic principles and contemporary pharmacological evidence [37], [38].

2.3. Analytical Framework and Correlation

The core of the methodology lies in the systematic correlation of traditional Ayurvedic properties with modern analytical findings. The unctuous (Snigdha) and heavy (Guru) properties of Ikshurasa were evaluated alongside its chemical profiling via Gas Chromatography-Mass Spectrometry, which reveals high concentrations of phyto-components capable of protecting cells against oxidative damage [39]. The synthesis further analyzed the sensory properties of natural sweeteners and their metabolic impact, drawing parallels between the Madhura Rasa and its role in modulating gustatory receptors and intestinal chemosensory cells [2], [40].

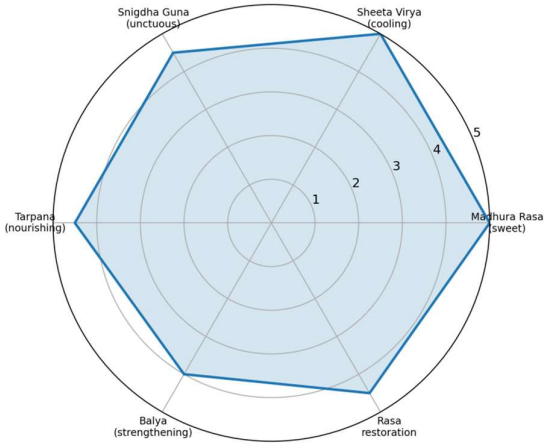
Furthermore, the study investigated how specific nutrients in Ikshurasa serve as natural osmotic agents, influencing cellular fluid dynamics and addressing the sensation of thirstiness [1]. By integrating these multidisciplinary parameters, ranging from Agni and Dhatu theories to bio-signaling pathways, this methodology establishes a mechanistic basis for Ikshurasa as a therapeutic agent [14], [41]. The investigation concluded with a critical evaluation of the historical context of its usage in various Ayurvedic formulations, ensuring that the preparation methods described in antiquity are assessed for their potential influence on modern therapeutic efficacy [30], [39]. The diverse carbohydrate composition, notably high total sugar and sucrose content, alongside nutritionally relevant levels of calcium, iron, and potassium, further underscore its potential as an energy-rich rehydrating agent [42]. This comprehensive analytical framework allows for a robust interpretation of how Ikshurasa's biochemical constituents align with its traditional Ayurvedic applications in alleviating Trishna, thereby bridging ancient wisdom with contemporary scientific understanding. This integration provides a comprehensive perspective on the observed physiological benefits, extending beyond mere symptomatic relief to encompass deeper metabolic and cellular actions. This interdisciplinary approach, combining traditional Ayurvedic principles with modern scientific analysis, elucidates how the complex matrix of Ikshurasa's constituents contributes to its therapeutic efficacy in managing Trishna.

Table 2: Correlation between Trishna Pathogenesis and Ikshurasa Action

Pathological Factor in Trishna	Clinical/Conceptual Manifestation	Supportive Role of Ikshurasa
Pitta aggravation	Internal heat, burning sensation, and intense thirst	Sheeta Virya provides cooling action and helps reduce heat dominance.
Vata aggravation	Dryness, roughness, restlessness, and fluid depletion	Snigdha and Madhura qualities soothe dryness and support restoration.
Rasa Dhatu depletion	Reduced nourishment and systemic dehydration	Tarpana and hydrating properties replenish fluid tissue.
Udakavaha Srotas disturbance	Impaired water distribution and persistent thirst	Natural water, minerals, and sugars

		support fluid movement and balance.
Agni disturbance	Metabolic stress and weakness	Easily available carbohydrates provide immediate metabolic support.

Figure 2. Ayurvedic pharmacological profile of Ikshurasa



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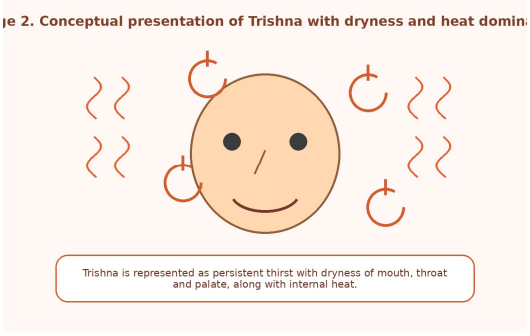
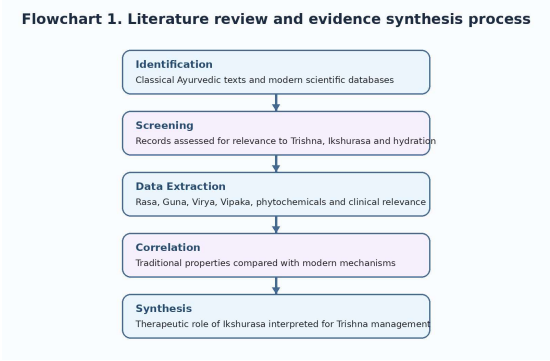
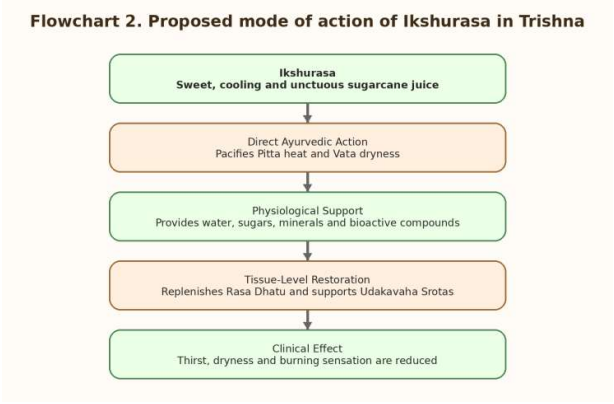


Image 2: Conceptual Presentation of Trishna with Dryness and Heat Dominance



Flowchart 1: Literature Review and Evidence Synthesis Process



Flowchart 2: Proposed Mode of Action of Ikshurasa in Trishna

3. Results

The analysis of classical Ayurvedic literature and contemporary phytochemical data reveals that Ikshurasa (sugarcane juice) possesses a unique pharmacological profile that demonstrates significant potential in mitigating the multi-factorial symptoms of Trishna. The initial findings suggest that its therapeutic efficac y is rooted in the synergistic action of its Madhura Rasa (sweet taste) and Sita Virya (cold potency), which work in tandem to pacify the elevated Pitta and Vata Doshas typically implicated in pathological thirst. This dual action is primarily mediated through the juice's capacity to replenish depleted bodily fluids (Rasa Dhatu) and counteract the excessive internal heat associated with these doshic imbalances.

A central finding of this review is the role of Ikshurasa in systemic osmoregulation. The high natural sugar content of the juice provides an immediate source of metabolic energy while simultaneously serving as a substrate for maintaining osmotic pressure. The cooling potency of the juice is particularly effective in counteracting the calorific pathology of exacerbated Pitta, thereby

alleviating the sensory perception of excessive dryness and internal burning [12]. This symptomatic relief is not merely superficial; the unctuous (Snigdha) properties of Ikshurasa help restore the mucosal integrity of the palate and throat, which are often compromised during chronic thirst syndromes.

Furthermore, the complex phytochemical profile of Ikshurasa extends its utility beyond simple hydration. The juice is rich in bioactive compounds, including various polyphenols and flavonoids, which contribute to its significant antioxidant and anti-inflammatory properties [43]. These findings align with modern research indicating that natural herbal compounds are effective in modulating systemic oxidative stress and inflammatory markers that often accompany severe metabolic disorders and chronic dehydration [44]. By reducing the inflammatory burden on the Udakavaha Srotas (water-carrying channels), Ikshurasa facilitates a more efficient distribution of fluids throughout the tissues.

The nutritional analysis also highlights the presence of essential vitamins and minerals, such as potassium, calcium, magnesium, and iron, which are crucial for maintaining cellular hydration and electrolyte balance [45]. These micro-nutrients support the resolution of systemic imbalances by ensuring that fluid intake is successfully translated into cellular volume expansion. Specifically, the saccharide composition of Ikshurasa, dominated by glucose and fructose, plays a vital role in the kinetics of rehydration. Contemporary meta-analyses on hydrating beverages suggest that glucose facilitates rapid fluid transport across the gut epithelia through carbohydrate-sodium co-transport and solvent drag mechanisms [17]. This allows Ikshurasa to provide more rapid and sustained hydration compared to plain water, especially in states of physical exertion or heat-induced fluid loss.

Finally, the results suggest that Ikshurasa may influence deeper metabolic pathways implicated in long-term fluid homeostasis. Its potential to modulate aquaporin expression or renal handling of electrolytes suggests a role in optimizing water retention and systemic distribution. By integrating these diverse mechanisms, ranging from immediate doshic pacification to the modulation of cellular fluid dynamics, Ikshurasa emerges as a robust, nutrient-dense intervention for the management of Trishna and its associated metabolic disturbances. This comprehensive understanding positions Ikshurasa as a potent therapeutic agent, warranting further clinical investigation into its specific applications for various conditions characterized by dehydration and metabolic dysregulation, including its potential in ameliorating hyperglycemia-induced oxidative stress [44]. This is particularly relevant given recent findings correlating dehydration with protein catabolism and long-term physical symptoms, underscoring the necessity of effective rehydration strategies in complex metabolic states [46]. Moreover, the distinct metabolic responses observed across individuals to nutrient intake, as evidenced by varied molecular profiles, suggest that personalized approaches to Ikshurasa administration might optimize its efficacy in managing Trishna [47].

Table 3: Therapeutic Relevance of Bioactive Components in Ikshurasa

Component/Constituent Group	Functional Role	Expected Benefit in Trishna
Natural sugars	Provide quick energy and support intestinal fluid absorption	Useful in thirst associated with exhaustion and heat exposure.
Potassium and minerals	Assist electrolyte balance and cellular hydration	Support fluid retention and physiological stability.
Polyphenols and flavonoids	Provide antioxidant and anti-inflammatory activity	May reduce oxidative stress linked with dehydration and metabolic strain.
Organic acids	Support metabolic efficiency and pH balance	May improve overall recovery from fluid imbalance.
Water-rich juice matrix	Acts as a natural hydrating vehicle	Directly relieves dryness and supports replenishment of body fluids.

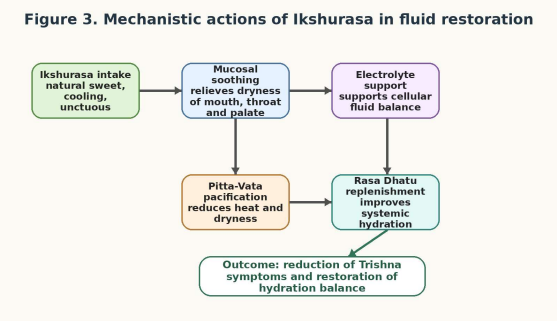


Figure 3: Mechanistic Actions of Ikshurasa in Fluid Restoration

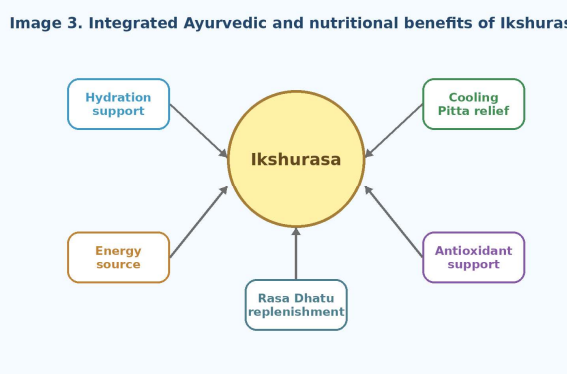


Image 3: Integrated Ayurvedic and Nutritional Benefits of Ikshurasa

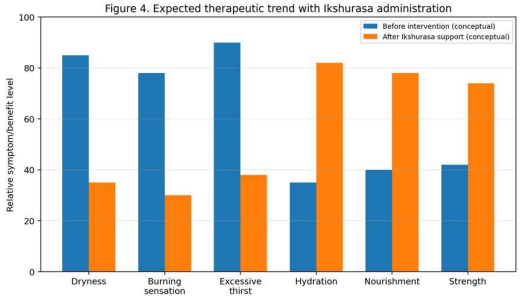


Figure 4: Expected Therapeutic Trend with Ikshurasa Administration

4. Discussion

The findings of this review underscore the multifaceted therapeutic potential of Ikshurasa (sugarcane juice) in the management of Trishna, a condition that transcends simple thirst to involve complex metabolic and electrolytic imbalances. The comprehensive biochemical profile of Ikshurasa, which includes essential electrolytes such as calcium, magnesium, potassium, and sodium, plays a critical role in maintaining cellular hydration and restoring electrolytic homeostasis [48]. This specific electrolytic composition is vital for mitigating the physiological stress associated with dehydration, a state that has been linked to the production of organic osmolytes and the induction of protein catabolism [46]. By supporting proper nerve conduction and muscle function, the minerals found in sugarcane juice address the systemic integrity often compromised in chronic Trishna presentations [42], [48].

A significant component of the therapeutic efficacy of Ikshurasa lies in its carbohydrate profile, dominated by sucrose and glucose. These rapidly metabolizable saccharides provide an immediate energy source that is essential for counteracting the catabolic state often triggered by prolonged fluid deprivation and metabolic stress [42]. Beyond simple caloric provision, the presence of these carbohydrates facilitates the restoration of cellular metabolism and can exert a supportive role in the body's recovery from exhaustive states [49]. This is particularly relevant in the context of Trishna, where the depletion of Rasa Dhatu often leads to a state of profound vital exhaustion.

Furthermore, the anti-inflammatory and antioxidant properties of Ikshurasa provide a mechanistic explanation for its ability to soothe the systemic "heat" associated with Pitta aggravation. The juice contains a diverse array of bioactive phytochemicals, including flavonoids and phenolic compounds, which have been shown to modulate cytokine release and inhibit pathways involved in the inflammatory response [50], [51]. These redox-active components contribute to the neutralization of free radicals and the reduction of oxidative stress, which are frequently elevated during chronic inflammatory conditions and metabolic disturbances [52], [53]. The intestinal anti-inflammatory effects observed in natural extracts further validate the traditional use of Ikshurasa in protecting the mucosal linings of the digestive tract from the drying effects of Trishna [50].

The therapeutic synergy is further enhanced by the presence of organic acids, such as succinic, malic, and citric acids. These compounds are instrumental in modulating cellular pH and enhancing metabolic efficiency, processes that are typically disrupted during states of dehydration and systemic imbalance [39]. These organic acids also possess inherent antioxidant properties, reinforcing the overall ability of Ikshurasa to resolve the oxidative burden associated with thirst-related pathology. By integrating these diverse pharmacological actions, ranging from rapid electrolytic replenishment and metabolic support to the modulation of inflammatory cascades, Ikshurasa emerges as a sophisticated, traditionally-grounded nutraceutical

intervention. This review suggests that the judicious application of sugarcane juice not only addresses the immediate sensory symptoms of Trishna but also facilitates deep-seated physiological recovery by restoring the body's homeostatic balance and metabolic vitality. Further research employing randomized controlled trials is warranted to elucidate the precise clinical efficacy of Ikshurasa across diverse Trishna etiologies and to establish standardized therapeutic protocols. This would involve detailed phytochemical analysis to identify and quantify the specific bioactive compounds responsible for these effects, similar to studies characterizing the antioxidant and anti-inflammatory constituents of other medicinal plants [43], [50], [51], [52]. For instance, the betalain pigment indicaxanthin, found in some plants, exhibits significant reducing properties and antioxidant effects that modulate redox-regulated cellular pathways, similar to the hypothesized mechanisms of certain Ikshurasa components [53].

Conclusion

This review underscores the intricate mechanisms through which Ikshurasa, according to both Ayurvedic principles and contemporary scientific frameworks, offers a comprehensive approach to managing Trishna. Rather than providing mere symptomatic relief, sugarcane juice addresses the underlying physiological and doshic imbalances, specifically the aggravation of Pitta and Vata and the subsequent depletion of Rasa Dhatu. The synergistic combination of its Madhura Rasa, Sheeta Virya, and nutrient-rich profile allows it to restore systemic hydration, provide immediate metabolic energy, and mitigate cellular oxidative stress through its inherent polyphenolic content.

To further advance these conceptual findings, future research must transition toward rigorous clinical trials aimed at meticulously quantifying the effects of Ikshurasa on key physiological markers of hydration, inflammatory cytokines, and renal metabolic regulation. Utilizing advanced analytical techniques to precisely identify the specific bioactive compounds responsible for its therapeutic actions will be essential in establishing a robust pharmacokinetic and pharmacodynamic profile. Furthermore, subsequent investigations should explore the long-term metabolic implications of regular sugarcane juice consumption, particularly regarding glucose homeostasis and insulin sensitivity in pre-diabetic populations, given its significant carbohydrate density. Additionally, exploring the potential synergy between Ikshurasa and other traditional Ayurvedic formulations could facilitate the development of more effective, personalized therapeutic protocols. Such a multidisciplinary approach will ensure the optimal integration of Ikshurasa into modern healthcare paradigms, effectively bridging ancient ethnomedical knowledge with rigorous evidence-based practice to provide a natural, holistic solution for the management of chronic thirst syndromes.

References

1. R. Picó-Munyoz, A. Tárrega, and L. Laguna, “Origins of thirstiness sensation and current food solutions,” Comprehensive Reviews in Food Science and Food Safety, vol. 22, no. 6, p. 4433, Aug. 2023, doi: 10.1111/1541-4337.13229.
2. M. R. Mora and R. Dando, “The sensory properties and metabolic impact of natural and synthetic sweeteners,” Comprehensive Reviews in Food Science and Food Safety, vol. 20, no. 2, p. 1554, Feb. 2021, doi: 10.1111/1541-4337.12703.
3. R. R. Dias, M. HS, and G. Puttur, “A CRITICAL ANALYSIS ON NIRUHA BASTI SAMMELANA VIDHI,” International Research Journal of Pharmacy , vol. 12, no. 9, p. 33, Oct. 2021, doi: 10.7897/2230-8407.1209163.
4. V. V. Pawar, V. Kaknurkar, and M. Bhosale, “An Ayurvedic Review of the Role of Patrapinda Sweda in Gridhrasi,” International Journal of Innovative Science and Research Technology (IJISRT), p. 119, Feb. 2026, doi: 10.38124/ijisrt/26feb181.
5. N. Biswas, N. Hosamani, and T. Singh, “Efficacy of Sringhi (Śṛṅga) Therapy in Management of Chronic Neck and Shoulder Pain: A Case Report,” International Journal of Innovative Science and Research Technology (IJISRT), p. 759, Feb. 2026, doi: 10.38124/ijisrt/26feb522.
6. H. Vasudev, M. HS, and G. Puttur, “A CONCEPTUAL STUDY ON PREVENTING LIFESTYLE DISORDERS IN AYURVEDA,” International Research Journal of Pharmacy , vol. 12, no. 9, p. 21, Oct. 2021, doi: 10.7897/2230-8407.1209161.
7. N. Chandrasekaran, A. Ramesh, A. Charles, A. Baskaran, N. Subramaniyan, and V. Rajendran, “A Comprehensive Review on Chooranam Formulation in Siddha Medicine,” International Journal of Innovative Science and Research Technology (IJISRT) , p. 2915, Dec. 2025, doi: 10.38124/ijisrt/25nov1470.
8. T. Sagarkumar, D. Verma, H. V. Patel, and A. V. Mangrola, “Cow Urine Mediated Poly Herbal Formulation Preparation,

Characterization, and Assessment of Antiglycation and Anti-Diabetic Activity," International Journal of Innovative Science and Research Technology (IJISRT) , p. 3216, Jun. 2024, doi: 10.38124/ijisrt/ijisrt24apr2618.

9. M. A. S. Hairani, F. A. A. Majid, N. H. Zakaria, D. Hudiyanti, A. Fadhlina, and H. I. Sheikh, "Anti-diabetic properties of traditional herbal concoction containing Eleutherine palmifolia (L.) Merr., Momordica charantia L., and Syzygium polyanthum (Wight.): a bibliometric analysis," Food Production Processing and Nutrition, vol. 5, no. 1, Jul. 2023, doi: 10.1186/s43014-023-00172-x.

10. R. B. Malabadi, K. K. P., M. N. T., and C. R. K., "Triphala: An Indian Ayurvedic herbal formulation for coronavirus (SARS-CoV-2) disease (Covid-19)," International Journal of Current Research in Biosciences and Plant Biology , vol. 8, no. 8, p. 18, Aug. 2021, doi: 10.20546/ijcrbp.2021.808.003.

11. A. G. Gaikwad, S. M. Dhange, B. C. Gaikwad, S. R. Dhutraj, and L. A. Gaikar, "Formulation and Evaluation of Polyherbal Cough Gutika," International Journal of Innovative Science and Research Technology (IJISRT), p. 672, Jun. 2024, doi: 10.38124/ijisrt/ijisrt24jun170.

12. A. K. Mali, P. Chavan, and P. Bhoir, "Tinospora Cordifolia and Pterocarpus Marsupium: An Anti-Diabetic Plant with Multipurpose," International Journal of Innovative Science and Research Technology (IJISRT), p. 348, Nov. 2024, doi: 10.38124/ijisrt/ijisrt24nov144.

13. S. P. Patil and S. Panwar, "Ayurvedic Research and Methodology: Present Status and Future Strategies," International Journal of Advanced Research in Science Communication and Technology, p. 283, Jun. 2022, doi: 10.48175/ijarsct-4811.

14. R. Sharma, "Role of Multidisciplinary Approach in Research Innovation in Ayurveda," International Journal for Research in Applied Science and Engineering Technology , vol. 12, no. 2, p. 22, Feb. 2024, doi: 10.22214/ijraset.2024.58252.

15. B. Patwardhan, "Bridging Ayurveda with evidence-based scientific approaches in medicine," The EPMA Journal, vol. 5, no. 1. Springer Nature, Nov. 01, 2014. doi: 10.1186/1878-5085-5-19.

16. L. Mougin, H. Z. Macrae, L. Taylor, L. J. James, and S. A. Mears, "The Effect of Heat Stress and Dehydration on Carbohydrate Use During Endurance Exercise: A Systematic Review and Meta-Analysis," Sports Medicine. Springer Science+Business Media, Aug. 20, 2025. doi: 10.1007/s40279-025-02294-3.

17. D. S. Rowlands, B. H. Kopetschny, and C. E. Badenhorst, "The Hydrating Effects of Hypertonic, Isotonic and Hypotonic Sports Drinks and Waters on Central Hydration During Continuous Exercise: A Systematic Meta-Analysis and Perspective," Sports Medicine, vol. 52, no. 2. Springer Science+Business Media, p. 349, Oct. 30, 2021. doi: 10.1007/s40279-021-01558-y.

18. M. K. Kelly et al, "Heat Adaptation for Females: A Systematic Review and Meta-Analysis of Physiological Adaptations and Exercise Performance in the Heat," Sports Medicine, vol. 53, no. 7. Springer Science+Business Media, p. 1395, May 24, 2023. doi: 10.1007/s40279-023-01831-2.

19. R. Walmsley, L. Chong, M. W. Hii, R. M. Brown, and P. Sumithran, "The effect of bariatric surgery on the expression of gastrointestinal taste receptors: A systematic review," Reviews in Endocrine and Metabolic Disorders, vol. 25, no. 2. Springer Science+Business Media, p. 421, Jan. 11, 2024. doi: 10.1007/s11154-023-09865-7.

20. W. T. Jardine et al, "The Effect of Pre-Exercise Hyperhydration on Exercise Performance, Physiological Outcomes and Gastrointestinal Symptoms: A Systematic Review," Sports Medicine, vol. 53, no. 11. Springer Science+Business Media, p. 2111, Jul. 25, 2023. doi: 10.1007/s40279-023-01885-2.

21. J. Peel, M. A. McNarry, S. M. Heffernan, V. R. Nevola, L. P. Kilduff, and M. Waldron, "The Effect of Dietary Supplements on Endurance Exercise Performance and Core Temperature in Hot Environments: A Meta-analysis and Meta-regression," Sports Medicine , vol. 51, no. 11. Springer Science+Business Media, p. 2351, Jun. 15, 2021. doi: 10.1007/s40279-021-01500-2.

22. U. Izuka, G. G. Ojo, S. A. Ayodeji, T. C. Ndiwe, and V. E. Ehiaguina, "POWERING RURAL HEALTHCARE WITH SUSTAINABLE ENERGY: A GLOBAL REVIEW OF SOLAR SOLUTIONS," Engineering Science & Technology Journal, vol. 4, no. 4. Fair East Publishers, p. 190, Oct. 17, 2023. doi: 10.51594/estj. v4i4.582.

23. B. A. Odulaja, O. C. Nnabugwu, A. A. Abdul, C. A. Udeh, and C. Daraojimba, "HR'S ROLE IN ORGANIZATIONAL CHANGE WITHIN NIGERIA'S RENEWABLE ENERGY

SECTOR: A REVIEW," Engineering Science & Technology Journal , vol. 4, no. 5. Fair East Publishers, p. 259, Nov. 29, 2023. doi: 10.51594/estj. v4i5.615.

24. T. O. Jejeniwa, N. Z. Mhlongo, and T. O. Jejeniwa, "Diversity and inclusion in the workplace: a conceptual framework comparing the USA and Nigeria," International Journal of Management & Entrepreneurship Research , vol. 6, no. 5, p. 1368, May 2024, doi: 10.51594/ijmer.v6i5.1090.
25. H. Abu-Bakar, L. Williams, and S. Hallett, "A review of household water demand management and consumption measurement," Journal of Cleaner Production, vol. 292. Elsevier BV, p. 125872, Jan. 09, 2021. doi: 10.1016/j.jclepro.2021.125872.
26. M. Waldron, R. Fowler, S. M. Heffernan, J. Tallent, L. P. Kilduff, and O. Jeffries, "Effects of Heat Acclimation and Acclimatisation on Maximal Aerobic Capacity Compared to Exercise Alone in Both Thermoneutral and Hot Environments: A Meta-Analysis and Meta-Regression," Sports Medicine , vol. 51, no. 7. Springer Science+Business Media, p. 1509, Apr. 03, 2021. doi: 10.1007/s40279-021-01445-6.
27. M. Ghannoum et al., "Extracorporeal treatment for ethylene glycol poisoning: systematic review and recommendations from the EXTRIP workgroup," Critical Care, vol. 27, no. 1. BioMed Central, Feb. 10, 2023. doi: 10.1186/s13054-022-04227-2.
28. A. Singh, U. R. Lal, H. M. Mukhtar, P. Singh, G. L. Shah, and R. Dhawan, 0"Phytochemical profile of sugarcane and its potential health aspects," Pharmacognosy Reviews/Bioinformatics Trends/Pharmacognosy review , vol. 9, no. 17, p. 45, Jan. 2015, doi: 10.4103/0973-7847.156340.
29. M. K. Dash, N. Joshi, K. Mahla, M. Vindhyaraj, and M. K. Dash, International Journal of Green Pharmacy , vol. 12, no. 1, Mar. 2018, doi: 10.22377/ijgp.v12i01.1599.
30. U. R. Lal and I. P. Singh, "Review and Implications of Traditional Indian Medicine for Inflammatory Bowel Disease," in IntechOpen eBooks, IntechOpen, 2019. doi: 10.5772/intechopen.89465.
31. A. Paoli and F. Campa, "Problems and Opportunities in the use of Bioelectrical Impedance Analysis for Assessing Body Composition During Ketogenic Diets: A Scoping Review," Current Obesity Reports, vol. 13, no. 3. Springer Science+Business Media, p. 496, May 27, 2024. doi: 10.1007/s13679-024-00573-0.
32. I. Araf, A. Idri, and I. Chairi, "Cost-sensitive learning for imbalanced medical data: a review," Artificial Intelligence Review, vol. 57, no. 4. Springer Science+Business Media, Mar. 01, 2024. doi: 10.1007/s10462-023-10652-8.
33. J. J. Lee et al., "Relation of Change or Substitution of Low- and No-Calorie Sweetened Beverages with Cardiometabolic Outcomes: A Systematic Review and Meta-analysis of Prospective Cohort Studies," Diabetes Care, vol. 45, no. 8. American Diabetes Association, p. 1917, Jul. 26, 2022. doi: 10.2337/dc21-2130.
34. A. Ahmad and H. Sabbour, "Effectiveness and safety of the combination of sodium–glucose transport protein 2 inhibitors and glucagon-like peptide-1 receptor agonists in patients with type 2 diabetes mellitus: a systematic review and meta-analysis of observational studies," Cardiovascular Diabetology , vol. 23, no. 1. BioMed Central, Mar. 18, 2024. doi: 10.1186/s12933-024-02192-4.
35. G. Gil et al., "Health effects associated with chewing tobacco: a Burden of Proof study," Nature Communications, vol. 15, no. 1. Nature Portfolio, Feb. 05, 2024. doi: 10.1038/s41467-024-45074-9.
36. T. M. van de Kerkhof, C. C. W. G. Bongers, J. D. Périard, and T. M. H. Eijsvogels, "Performance Benefits of Pre- and Per-cooling on Self-paced Versus Constant Workload Exercise: A Systematic Review and Meta-analysis," Sports Medicine, vol. 54, no. 2. Springer Science+Business Media, p. 447, Oct. 06, 2023. doi: 10.1007/s40279-023-01940-y.
37. A. J. Lowik, C. Mniszak, M. Pang, K. Ziafat, M. Karamouzian, and R. Knight, "A sex- and gender-based analysis of alcohol treatment intervention research involving youth: A methodological systematic review," PLoS Medicine, vol. 21, no. 6, Jun. 2024, doi: 10.1371/journal.pmed.1004413.
38. K. Bischof, A. M. Moitzi, S. Stafilidis, and D. König, "Impact of Collagen Peptide Supplementation in Combination with Long-Term Physical Training on Strength, Musculotendinous Remodeling, Functional Recovery, and Body Composition in Healthy Adults: A Systematic Review with Meta-analysis," Sports Medicine , vol. 54, no. 11. Springer Science+Business Media, p. 2865, Jul. 26, 2024. doi: 10.1007/s40279-024-02079-0.

39. R. Rajendran, R. B. dasan, K. S. esh, and K. mar, "GC-MS Analysis of Phyto-Components in Raw and Treated Sugarcane Juice," International Journal of Current Microbiology and Applied Sciences , vol. 6, no. 7, p. 51, Jul. 2017, doi: 10.20546/ijcmas.2017.607.007.

40. P. D. Chaugule, "EXPLORING THE ROLE OF TIKTA RASA (BITTER TASTE) THROUGH BIO-SIGNALING PATHWAYS IN TARGETED TREATMENT OF TYPE II DIABETES MELLITUS: A REVIEW," International Journal of Research in Ayurveda and Pharmacy , vol. 9, no. 3, p. 17, Jun. 2018, doi: 10.7897/2277-4343.09354.

41. Sweta, A. Godbole, S. Prajapati, and H. H. Awasthi, "Role of modern parameters in Ayurvedic researches," The Journal of Phytopharmacology , vol. 6, no. 3, p. 200, Jun. 2017, doi: 10.31254/phyto.2017.6310.

42. M. Elbagory et al. , "Assessment of carbohydrates, minerals, and potentially toxic elements: risk evaluation in traditionally produced sugarcane jaggery," Food Production Processing and Nutrition , vol. 8, no. 1, Mar. 2026, doi: 10.1186/s43014-025-00357-6.

43. S. B. Gollapudi and V. S. Laxmikanth, "Optimization of RTS Beverage: Tinospora Cordifolia and Kiwi Juice Fusion By IJISRT," International Journal of Innovative Science and Research Technology (IJISRT) , p. 941, Mar. 2024, doi: 10.38124/ijisrt/ijisrt24mar897.

44. A. Saara, H. Rafiq, K. Asra, and M. Inara, "In-vitro antioxidant potential of conventional herbal decoction aiding diabetes metabolomics," International Journal of Medicine and Medical Sciences , vol. 14, no. 1, p. 20, Jun. 2022, doi: 10.5897/ijmms2021.1450.

45. N. Dembele et al. , "Ethnobotanical survey and phytochemical screening of aqueous extracts from Detarium microcarpum Guill. Perr in Mali," Journal of Medicinal Plants Research , vol. 16, no. 10, p. 280, Oct. 2022, doi: 10.5897/jmpr2022.7256.

46. M. Hultström et al. , "Dehydration is associated with production of organic osmolytes and predicts physical long-term symptoms after COVID-19: a multicenter cohort study," Critical Care , vol. 26, no. 1, Oct. 2022, doi: 10.1186/s13054-022-04203-w.

47. X. Shen et al. , "Multi-omics microsampling for the profiling of lifestyle-associated changes in health," Nature Biomedical Engineering , vol. 8, no. 1, p. 11, Jan. 2023, doi: 10.1038/s41551-022-00999-8.

48. D. Bagchi, B. W. Downs, M. Bagchi, and S. Kushner, "A technological breakthrough in developing a state-of-the-art nutraceutical sports nutrition formulation to enhance vitality, mental acuity, vigilance, energy, and stamina," Food Production Processing and Nutrition , vol. 4, no. 1, Mar. 2022, doi: 10.1186/s43014-022-00085-1.

49. S. Majumder et al., "In vitro bioactivities and gastrointestinal simulation validate ethnomedicinal efficacy of five fermented kodo-based Himalayan traditional drinks and bioaccessibility of bioactive components," Food Production Processing and Nutrition, vol. 6, no. 1, Feb. 2024, doi: 10.1186/s43014-023-00184-7.

50. T. Vezza et al. , "The Antioxidant Properties of Salvia verbenaca Extract Contribute to Its Intestinal Antiinflammatory Effects in Experimental Colitis in Rats," Antioxidants , vol. 12, no. 12, p. 2071, Dec. 2023, doi: 10.3390/antiox12122071.

51. A. E. Morakinyo, H. O. Salawudeen, and O. O. Oyedapo, "Comparative studies of antioxidant and anti-inflammatory potentials of ethanolic leaf extract of Sorghum bicolor and Zea mays," Journal of Medicinal Plants Research , vol. 15, no. 8, p. 339, Aug. 2021, doi: 10.5897/jmpr2020.7028.

52. C. Nediani, J. Ruzzolini, and M. Dinu, "Oxidative Stress and Inflammation as Targets for Novel Preventive and Therapeutic Approaches in Non-Communicable Diseases III," Antioxidants , vol. 13, no. 11, p. 1404, Nov. 2024, doi: 10.3390/antiox13111404.

53. A. Attanzio, I. Restivo, M. Tutone, L. Tesoriere, M. Allegra, and M. A. Livrea, "Redox Properties, Bioactivity and Health Effects of Indicaxanthin, a Bioavailable Phytochemical from Opuntia ficus indica, L.: A Critical Review of Accumulated Evidence and Perspectives," Antioxidants , vol. 11, no. 12. Multidisciplinary Digital Publishing Institute, p. 2364, Nov. 29, 2022. doi: 10.3390/antiox11122364.