Research Article

Kleda: A Comprehensive Conceptual Analysis of the Ayurvedic Concept of Biological Moisture and Its Pathophysiological Significance

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Abstract

Background: Kleda, a fundamental Ayurvedic concept denoting biological moisture, wetness, or fluid milieu, occupies a central position in classical Ayurvedic physiology (Sharira Kriya), pathology (Roga Vigyana), and clinical management (Chikitsa). Despite its ubiquity in Ayurvedic texts – referenced extensively in Charaka Samhita, Sushruta Samhita, and Ashtang Hridayam – a consolidates conceptual analysis of Kleda from a biomedical perspective remains lacking I the contemporary literature.

Objectives: To systematically review classical Ayurvedic references to Kleda; to analyse its Mahabhoot constitution, Guna, physiological functions (Prakruta Karma), pathological manifestations (Vikruta Avastha), and clinical relevance in major disease entities including Prameha, Kushtha, Visarpa and Krumija Roga.

Methods: A comprehensive textual review was conducted using primary classical Ayurvedic sources – CharakaSamhita, Sushruta Samhita, and Ashtang Hridayam – with cross-reference to authoritative commentaries (Dalhan, Chakrapanidatta). Relevant Shlokas were collected, translated, and interpreted in the context of contemporary biomedical science.

Results: Kleda is identified as an Aap Mahabhoot-dominant entity characterised by Drava, Snigdha, Sara, and Sheet Guna. Physiologically, it facilitates Annashaithilya (softening of food), maintains tissue hydration (Ardrata), supports Kala Nirman, and is eliminated via Mutra and Sweda. Pathological Kleda – arising from Pitta or Kapha Dushti – underpins the pathogenesis of Prameha, Kushtha complications, Krumija Shirashool, Krumija Hrudrog, and Visarpa. The Dosha-specific quality of excess Kleda (Ushna- Drava in Pitta; Sheeta- Drava in Kapha) explains distinct clinical presentations.

Conclusion: Kleda, represents a sophisticated Ayurvedic concept paralleling modern concepts of extracellular fluid homeostasis, lymphatic filtration, and mucosal secretion. A nuanced understanding of Kleda's physiology and pathology enriches Ayurvedic clinical reasoning and offers novel frameworks for understanding diseases characterized by aberrant fluid metabolism.

Keywords: *Kleda, Ayurveda, Biological moisture, Aap Mahabhoot, Prameha, Dosha Vichar, Sharira Dravata, Ayurvedic physiology*

1. Introduction

The classical Ayurvedic lexicon encompasses numerous physiological entities that govern bodily function, each embedded within a coherent theoretical framework that integrates cosmological elements (Panchamahabhoot), biological humours (Tridosha), and tissue-level processes (Dhatu Poshana). Among these, Kleda – broadly translatable as biological moisture, wetness (Dravata), or fluid-mediated softening – represents a concept of considerable physiological importance, yet one that has not received systematic scholarly attention in the indexed literature.

The root term 'Klid' in Sanskrit implies moistening, softening, and fluid impregnation. Classical commentators such as Dalhan gloss Prakleda as Ardra-bhava-karana – the induction of a moist or hydrated state (SU. Su. 46/520). Kleda thus describes not merely a substance, but a physiological quality and process: the continuous maintenance of a hydrated milieu within the body's tissues, digested tract, and secretory systems.

Kleda occupies a unique intermediate position between the Dosha (Kapha and Pitta, both sharing Drava Guna) and the Malas (excretory products including Mutra and Sweda). It participates in Ahara Parinaman (food transformation), structural integrity of the Kala (membranous sheaths), and is listed among the six Ahara Parinamakara Bhavas – the essential factors governing proper digestion and tissue transformation (Cha. Sha. 6/14). Its derangement features prominently and inflammatory conditions (Krumija Roga, Visarpa, Kushtha).

This review aims to consolidate, analyse, and critically interpret all major classical references to Kleda in a structures format amenable to modern academic discourse, thereby establishing Kleda as a distinct and clinically relevant physiological constructin Ayurveda.

2. Materials And Methods

A textual, descriptive review methodology was adopted. Primary classical ayurvedic texts – Charaka Samhita (Cha.), Sushruta Samhita (Su.), and Ashtang Hridayam (A. Hru.) – were selected as source documents. Relevant Shlokas pertaining to Kleda were identified across all major Sthanas (sections) of these texts using standard indices and commentaries, including Chakrapanidatta's Ayurveda Dipika and Dalhana's Nibandha Sangraha.
Inclusion criteria comprised all Shlokas in which 'Kleda', 'Prakleda', 'Sankleda', or 'Upakleda' appeared in the context of physiology, pathology, pharmacology, or clinical management. Data were organized under thematic headings: Etymology and Definition, Mahabhoot Constitution and Guna, Physiological Functions, Srota-Sambandha, Rasa-Kleda Relationship, Dosha Vichar, Pathological Formations, Disease-specific Relevance, and Dietary Considerations. No experimental or clinical data were generated; the study is purely conceptual and textual in nature.

3. Results

3.1 Etymology, Definition, and Textual Context

The Sanskrit verbal root 'Klid' (क्लिद्) signifies the act of becoming moist, wet, or softened. The derived noun Kleda (क्लेद) thus denoted the state or substance responsisble for this quality. Key textual definitions are as follows:

Reference	Definition/ Context
Su. Su. 46/520 (Dalhana)	Dravah Prakledanah – fluid causes moistening; Prakleda = Ardra-bhava-karana (induction of a moist state)
Su. Su. 6/8	Shitamshu kledayatyurvim – the moon moistens the earth (illustrating Kleda's cosmological basis in Aap Mahabhoot)
Cha. Sha. 6/15	Kledah shaithilyamaapadayati – Kleda induces loosening/softening (of fod/tissies)
Cha. Su. 12/16-17	Kledaka Kapha – the sub-type of Kapha residing in Amasaya, which moistens the food bolus (Annasamghata) and facilitates digestion

The definition thus encompasses both the substance (the fluid/moist entity) and the fnctional process (Prakleda – the act of moistening). Kleda is distinguished from Kapha itself by its functional transience and its role as an intermediate product between indigested food/Dosha and the final excretory products.

3.2 Mahabhoot Constitution and Guna

Kleda is predominantly constitutes of Aap Mahabhoot. Charaka Samhita Sutrasthan 26/11 enumerates the properties of Apya (water-predominant) substances as: Drava (liquid), Snigdha (uncutuous/oily), Sheet (cool), Manda (slow), Mridu (soft), and Picchila (slimy). Their functional attributes include Upakleda (slight moistening), Sneh 9uncutousness), Bandha (binding0, Vishyanda (liquedaction), Mardava (softening), and Prahlada (nourishment/satisfaction).

Property	Description
Mahabhoot	Aap (Water element) predominant
Guna (Qualities)	Drava (liquid), Snigdha (uncutuous), Sara (mobile/flowing), Sheet (cool)
Karma (Functions)	Upakleda, Sneha (lubricayion), Bandha (cohesion), Mardava (softening), Prakleda (nourishment)

Relation to Kapha	Shares Sheet, Snigdha with kapha; differs by Sara and Drava (Kapha is Sandra/Sthira)
Relation to Pitta	Shares Drava and Sara with Pitta; differs by Sheet (Pitta is Ushna)

This Guna profile explains Kleda's intermediate position between Kapha (cool, heavy, stable) and Pitta (hot, mobile, liquid) – an entity that can be skewed toward either Dosha under pathological conditions.

3.3 Physiological Functions (Prakruta Karma) and Sroto-Sambandha

Classical tests enumerate three primary physiological roles of Kleda, each associated with a specific Srotasa:

Function	Description	Associated Srotasa/ Reference
Annashaithilya	Softening and loosening of the food bolus in the gastrointestinal tract, facilitating digestion	Annavaha Srotas; Cha. Sha. 6/15
Ardrata Maintenaced	Maintenance of normal tissue hydration, Kleda-abhava (deficiency) leads to Shosha (desiccation/ wasting)	Systemic; Rasa-Rakra Dhatu
Kala Nirman	Participation in the formation of Kala – the functional membrane between Ashaya (cavity) and Dhatu – arising from interstitial fluid condensed by Dhatu-specific Ushna	A. Hru. Sha. 3/9

The Nirharan (elimination) of Kleda occurs through two primary channels: (1) Mutra (urine)via Mutravaha Srotasa – Mutrasyakledavahanam (A. Hru. Su. 11/5) – where Mutra is the Kitta-Dravabhaga (liquid fraction of metabolic waster) along with Anna-Kleda; and (2) Sweda (perspiration) – Swedasya kledavidritih (A. Hru. Su. 11/5).

The dual role of Kleda – as a physiological necessity (tissue hydration, digestion) and as a waste product requiring elimination (via Mutra and Sweda) – parallels the modern concept of extracellular fluid asboth a physiological medium and a filtrate requiring renal and integumentary clearance.

3.4 Relationship of Kleda with Rasa (Taste)

Charaka Samhita Sutrasthan 26/43 and Sushruta Samhita Sutrasthan 42/10 systematically detail how each of the six tastes (Shad Rasa) influences Kleda, providing a rational basis for dietary management of Kleda-related disorders:

Rasa (Taste)	Effect on Kleda	Reference
Madhura (Sweet)	Promotes Kleda via Snigdha, Sheeta, Guru qualities; nourishes Aap Mahabhoot	Cha. Su 26/43
Amla (Sour)	Kleda-inducing; softens and liquefies food; also promotes Aap	Cha. Su. 26/43; Su Su 42/10
Lavana (Salt)	Kledana (moistening) and Shaithilyakrit (loosening); moderately Ushna	Cha. Su. 26/43; Su Su 42/10
Katu (Pungent)	Abhishyanda, Sneha, and Sweda-promoting; but also, Kleda-reducing through Ushna Virya	Cha. Su 26/43
Tikta (Bitter)	Reduces Kleda; also reduces Meda, Vasa, Majja, Lasika, Purisha, Pitta, Kapha	Cha. Su. 26/43; Su Su 42/10
Kashaya (Astringent)	Kleda-absorbing (Kledopashoshan); binding and drying	Cha. Su. 26/43; Su Su 42/10

This table demonstrates that Kleda can be both increased (by Madhura, Amla. Lavana) and decreased (by Tikta, Kashaya) throught dietary modulation – a principle with direct clinical application in conditions of Kleda excess such as Prameha and Sthaulya.

3.5 Dosha Vichar: Pathological Formations of Kleda

Under conditions of Dosha aggravation, Kleda undergoes qualitative transformation, producing distinct pathological manifestations:

Dosha State	Qualitative Kleda Change	Clinical Manifestation
Kleda Kshaya	Desiccation of Kleda → Vata Vriddhi → Shosha (wasting)	Emaciation, dryness, tissue depletion
Pitta Dushti (Ushna-Drava)	Ushna-Pradhan Dravata → heated, mobile Kleda	Shonita-Kleda (blood vitiation), mamsa-Kleda (muscular suppuration), Daaha, Paaka, Srava, Raga
Kapha Dushti (Sheeta-Drava)	Sheeta-Pradhan Dravata → cool, heavy, viscous Kleda	Srava (discharge), Uplepa (coating), Staimitya (stiffness), Trupti (Satiety), Apakti (indigestion)

The Vikruta Kleda arising from Kupit itta (A. Hru. Su. 12/51-52) is explicitly described alongside Sweda (perspiration), Sruti (flow), Kotha (putrefaction), Sadana (lassitude), and Murchchhana (syncope) – indicating systemic inflammatory states with fluid dysregulation. Similarly, Cha. Su. 20/15 associates Pitta-Vikruta Kleda with Daaha (burning), Aushnya (heat), Paaka (suppuration), Srava (discharge), and abnormal Gandha (odour) – all features of indected or inflamed exudation.

3.6 Kleda in Major Disease Conditions

The pathological role of Kleda is elaborated across multiple clinical conditions in classical texts:

3.6.1 Prameha (Urinary / Metabolic Disorders)

Kleda occupies a central position in the samprapti of Prameha. The Hetu (causative factors) include Sheeta, Snigdha, Madhura, Medya, and drava Annapana – all of which augment Kleda. Among the Dushyas (vitiated body elements) listed in Cha. Ni. 4/7-8, Sharira-Kleda (bodily moisture) features alongside Meda, Mamsa, Shukra, Shonita, Vasa, Majja, Lasika, and rasa. Excess Kleda is routed abnormally into the urinary tract, where it undergoes further Dushana, producing the diverse clinical presentations of Prameha.

The Apatarpana Vichar (therapeutic principle of reducing nourishment0 for Kaphaja and Pittaja Prameha is explicitly justified on the grounds of elevated Kleda, Meda, and Kapha (Cha. Chi. 6/51): when Kleda-Meda-Kapha are aggravated. Apatarpana (depletion therapy) is the primary intervention. This Underscores Kleda as a key therapeutic target in metabolic disease management.

3.6.2 Krumija Shirashool and Krumija Hrudrog (Microbial/Parasitic Disorders)

Charaka Samhita Sutrasthan 17/27-28 describes Krumija Shirashool arising from consumption of Tila (sesema), Ksheera (milk), Guda (jaggery), Ajirna (undigested0, and Puti (putrefies) food combinations. Such dietary patterns cause Kleda of Asrik (blood), Kapha, and Mamsa – creating a microenvironment milieu (Samkleda) in the Shiras that fosters Krimi (microbial/parasitic organisms).

Similarly, in Kumija Hrudrog (Cha. Su. 17/37-38), Samkleda at Marma-ekadesha (a vital focal point in the cardiac region) provides the substrate for Krimi Proliferation – paralleling modern concepts of biofilm formation in endocarditi or pericardial infection. The common mechanistic thread is: inappropriate Kleda-generating diet → Samkleda of blood and tissues → Krimi-fostering environment.

3.6.3 Kushtha (Dermatological Disorders)

In Kushtha, Kleda represents a pathological complication of neglected disease. Charaka Nidansthan 5/10 states that untreated Kushtha leads to Twak-Mamsa-Shonita-Lasika-Kotha-Kleda-Samsvedata – putrefaction and Kleda of skin, muscle, blood, and lymph (Lasika). This sequence – tissue Kotha (gangrene/necrosis) → Kleda – is consistent with the modern progression of chornic inflammatory skin disease to superinfection an liquefactive tissue destruction.

3.6.4 Visarpa (Erysipelas / Spreading Inflammatory Conditions)

In Shakhagat Rakta Dushti (vitiation of blood in the extrimities), Charaka Chikitsasthan 21/68-70 and Ashtang Hrudaya Chikitsasthan 18/8 both state: Twak-Mamsa-Snayu-Samkleda arises from Rakta-Kleda – indicating that pathological moisture/exudation originating from vitiated blood leads to liquefactive changesin skin, muscles,

and ligamentous tissues. The ter Samkleda (complete/intense Kleda) signals a stage of advanced tissue liquefaction or suppurative necrosis.

3.6.5 Janapadodwansa (Epidemics / Envirnmental Disease)

In the context of communal disease outbreaks (Janapadodwamsa), Charaka Samhita Vimansthan 3/7 identifies Kleda-bahula (excess Kleda) as a characteristic feature of both Rogajanak Jala (disease-causing water) and Ahitkara Desha (unhealthy environment/geography). This implies that pathologically elevated environmental or biological moisture facilitates disease transmission – a concept with obvious parallels in the epidemiology of waterborne diseases and humid-climate infections.

3.7 Dietary Substances with Excess Kleda-Producing Potential Atisevana Nishedha)

Charaka Samhita Vimansthan 1/15-18 lits three substances that should never be consumed excessively – Pippali(long pepper), Kshara (alkali preparations), Lavana (salt) – each chracterisedby Prakledi (strongly moistening/Kleda-promoting) properties. Pippali causes Prakleda of the gastrointestional mucosa (and is itself Katu with Madhura Vipaka); Kshara initially moistens (kledayati) then desiccates (Vishoshayati); Lavana is Upakledaka (moderately Kleda-inducing) and exacerbates Dosha when overused. The systematic listing of these three as requiring restraint emphasizes Kleda excess as a genuine pathological risk.

4. Discussion

The systematic review of classical references reveals Kleda to be a multidimensional physiological construct with parallels in contemporary biomedical science. The following correspondences are proposed:

Biological Fluid Homeostasis: The physiological Kleda – characterized by Sheeta, Snigdha, Drava, and Sara Guna – corresponds functionally to the concept of extracellular fluid (ECF), which maintains tissue hydration, enables diffusion of nutrients, and serves as the medium for waste clearance. Kleda's dual elimination via Mutra (renal filtration) and Sweda (transcutaneous secretion) directly mirrors ECF regulation through the kidneys and sweat glands.

Kledaka Kpaha and Gastrointestinal Secretions: Kledaka Kapha – the sub-type of Kapha in the Amasaya responsible for food moistening – corresponds closely to gastric mucus and salivary secretions, which facilitate mechanical and chemical digestion by maintaining a moist, protective gastric milieu. The Kledana Karma (moistening action) of Kledaka Kapha on Annasamghata (food bolus) parallels he role of mucin glycoproteins in bolus lubrication and mucosal protection.

Pathological Kleda and Inflammatory Exudate: Vikruta Kleda arising from Pitta aggravation – characterized by Ushna-Drava qualities with Srava, Paaka, Daaha, and Raga – corresponds to the warm, erythematous, purulent exudate of acute inflammation. The Kapha-vitiated Kleda – Sheeta-Drava with Sthaimitya, Srava, and Uplepa – resembles the cool, viscous, non-purulent effusion seen in chronic inflammatory states or serus cavities.

Samkleda and Biofilm/Necrosis: The concept of Samkleda (intense, localized pathological moistenin) as a prerequisite for Krimi proliferation (Krumija Shirashool, Krumija Hrudrog) is conceptually analogous to biofilm formation: pathogenic microorganisms require a moist, nutrient-rich substrate – precisely the conditions created by Samkleda of blood, lymph, and tissue. The progression from Samkleda to Krimi-janana mirrors the modern understanding of tissue maceration → secondary infection.

Kleda in Prameha and Modern Metabolic Syndrome: The role of excess Kleda in Prameha pathogenesis – augmented by Snigdha, Madhura, and Drava dietary inputs – is consistent with the metabolic syndrome concept, where excess dietary fat, refined carbohydrates, and calorie surplus create a state of lipid and fluid overload. The ayurvedic prescription of Apatarpana (calorie restriction and depletion therapies) as primary management aligns with modern lifestyle intervention strategies for type 2 diabetes and obesity.

Kleda Kshaya and Dehydration/Wasting: The pathological consequence of Kleda Kshaya (deficiency of biological moisture) – leading to Vata Vriddhi and Shosha (tissue wasting/desiccation) – corresponds to the pathophysiology of dehydration, cachexia, and tissue desiccation in chronic wasting diseases such as tuberculosis (historically termed Shosha in Ayurveda), cancer, and severe malnutrition.

Environmental Kleda and Epidemiology: The recognition in Janapadodwamsa that Kleda-bahula enviornments foster disease transmission anticipates the modern epidemiological understanding of humid, water-contaminated enviornments as risk factors for infectious disease outbreaks. This represents a remarkable classical insight into environmental determinants of health.

The concept of Kleda thus spans the entire spectrum of physiological and pathological fluid dynamics – from intraluminal gastrointestinal secretion to systemic fluid balance, from tissue hydration to inflammatory exudation, and from individual metabolic disease to population-level epidemics. Its systematic analysis offers a cohert Ayurvedic framework for understanding fluid-mediated disease processes.

5. Conclusion

Kleda is a foundational concept in Ayurvedic physiology and pathology, representing the biological moisture continuum that maintains tissue viability, facilitates digestion, and – when disrupted – underpins a diverse array of clinical conditions. Its Aap-Mahabhoot predominance and Guna profile (Drava, Snigdha, Sara, Sheeta) position it as an intermediary between the stability of Kapha and the dynamism of Pitta. Physiologically, kleda supports Annashaithilya, Ardrata, and Kala Nirman, while its elimination through Mutra and Sweda completes its metabolic cycle.

Pathologically, Kleda excess or qualitative vitiation (Vikruta Kleda) is implicated in the pathogenesis of Prameha, Kushtha, Visarpa, Krumija Roga, and JAnapadodwamsa – covering metabolic, dermatological, vascular, and infectious disease paradigms. The Dosha-specific quality of pathological Kleda (Pitta-dushit: Ushna-Drava; Kapha-dushit: Sheeta-Drava) provides a rational basis for Dosha-specific dietay and therapeutic interventions.

Contempory biomedical parallels – including extracellular fluid homeostasis, mucus secretion, inflammatory exudation, biofilm formation, and environmental epidemiology – validate the conceptual sophistication of classical Ayurvedic scholarship on Kleda. Future research should explore quantitative biomarkers (e.g., serum osmolality, inflammatory cytokines, mucosal secretory IgA) that might serve as modern correlates of Kleda status, enabling translational research in Ayurvedic clinical practice.

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