

Role of Udaka in the Pathogenesis and Management of Sthaulya (Obesity): Integrative Ayurvedic Perspectives with Anatomical correlation – A Narrative Review

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DOI: <https://doi.org/10.63001/tbs.2026.v21.i02.pp759-763>

KEYWORDS

Udaka, Kleda, Sthaulya
Sthaulya Samprapti, Meda
Dhatu, Obesity, Hydration

Revised on: 27/04/2026

Received on: 20/04/2026

Accepted on: 01/05/2026

Published on: 09/05/2026

Abstract

Sthaulya is a Santarpanotha Vikara marked by increased Meda buildup, limited movement, decreased vitality, and a higher risk of metabolic issues. The Charaka Samhita and other fundamental writings highlight the significance of Kapha, Meda, Agnimandya, and Srotorodha in the etiology of the disease. Nonetheless, in current integrated discourse, the contribution of Udaka—the physiological fluid principle that causes Kleda (moisture) and tissue hydration—continues to be understudied. This narrative review aims to link traditional Ayurvedic descriptions with anatomical, physiological, and metabolic data in order to evaluate the function of Udaka in the pathogenesis and treatment of Sthaulya. Primary Ayurvedic sources like the Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya were used in a narrative integrative review. The pertinent references to Udaka, Kleda, Kapha, Meda, and Sthaulya were methodically taken out and put together thematically. In a similar vein, contemporary biomedical literature was obtained from PubMed, Scopus, and Google Scholar using various keyword combinations, such as obesity, extracellular fluid, lymphatic dysfunction, adipose tissue inflammation, and extracellular matrix expansion. The anatomical and metabolic links between Udaka-mediated mechanisms were identified via conceptual mapping. According to traditional analysis, Udaka promotes physiological tissue lubrication, Dhatu nourishment, and Kapha stability. In particular, when combined with Agnimandya and Santarpana Ahara, the excessive rise of Udaka is pathological, leading to Kleda buildup and increasing the likelihood of Meda vriddhi, which eventually causes Srotorodha and Sthaulya. The reconstructed Samprapti shows a sequential cascade: Agnimandya → Ama formation → Kapha vriddhi → Udaka vriddhi → Kleda accumulation → Meda expansion → Srotorodha. Ayurvedic therapeutic approaches such as Langhana, Rukshana, Udvartana, and Lekhana-oriented treatments may have clinical advantages, at least in part, by altering tissue fluid dynamics and metabolic activation. Udaka is a viable conceptual counterpart to obesity-related extracellular fluid control and fluid-mediated metabolic dysfunction. Including this viewpoint broadens the knowledge of Sthaulya beyond adiposity and offers a translational framework for future empirical investigations of fluid biomarkers, body composition metrics, and lymphatic function in obesity phenotypes. To support this integrative model, thorough clinical validation is necessary.

1. INTRODUCTION

1.1 Concept of Udaka and Ap Mahabhuta

One nutrient that is necessary for life is water. The average inactive adult male needs to drink at least 2,900 mL (12 c) of fluid daily, and the average sedentary adult woman needs to drink at least 2,200 mL (9 c) of fluid daily from foods, soups, and noncaffeinated, non-alcoholic beverages. About 1,000 mL (4 c) of water is contributed by solid foods, and another 250 mL (1 c) comes from the water of oxidation.[1] Water that "does not

represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages" is considered safe drinking water, according to a 2017 World Health Organization assessment.[2]

The term Udaka refers to something which travels upward. "उदगच्छति इति उदकम्" (शब्दकल्पदुम). The term Udaka means Water.[3] Other similar terms such as Ap, Udaka and Jala refers to matter that possess the characteristic quality of fluidity.[4] In Ayurveda, Udaka refers to the functional biological fluid

matrix of the body, not just the water that is consumed. It serves as the foundation for Kapha, Kleda, Rasa, and Meda, and is under the control of the Ap Mahabhuta. According to classical texts like

the Sushruta Samhita and Charaka Samhita, Ap Mahabhuta has the characteristics of Snigdha (unctuous), Sheeta (cold), Mridu (soft), Sandra (dense), and Drava (fluid). These characteristics have a direct impact on tissue nutrition, fluid balance, lubrication, and structural integrity.[5] Charaka have mentioned that the Udaka praman in body is 10 Swaanjali (literally, measurable by taking water after joining both palms).[6]

Meda is one of the seven dhatu primarily composed of Ap and Prithvi mahabhuta.[7] As a result, changes in the quantity or quality of Āp Mahābhūta have subsequent consequences on Meda metabolism. Kleda is the fluid content that imparts moisture to the body. Kleda refers to the fluid content of the body that represents the Jala mahabhuta, possessing the liquid, unctuous and soft properties.[8]

Sthaulya and its pathogenesis

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) over 25 is considered overweight, and over 30 is obese.[9] In classical literature of Ayurveda, Obesity (Sthaulya) is referred to as Santarpanotha Vikara and is defined as a metabolic illness marked by an excess accumulation of Meda Dhatu, which is linked to Kapha dominance and Agnimandya.[10] Classical treatises such as Charaka Samhita and Sushruta Samhita depict Sthaulya as a condition brought about by overconsumption of Guru, Snigdha, and Madhura Ahara, along with Avyayama (sedentary habits) and Diwaswapna (day sleep), which results in Medovridhi and Srotorodha. The pathogenesis involves a progressive accumulation of Meda, Kapha aggravation, and Ama production as a result of impaired Jatharagni. According to Charak samhita, persons with Sthaulya have Alpa Ayu, Daurbalya, Atisweda, and Kshudra Shwasa, which are signs of a systemic metabolic compromise.[11]

From a biomedical standpoint, obesity is characterized by an unhealthy and excessive buildup of fat that is closely related to insulin resistance, dyslipidemia, cardiovascular disease, and chronic low-grade inflammation.[12] Modern studies highlight that lipid deposition is only one aspect of adipose tissue expansion, which also includes metabolic dysregulation, inflammatory cell infiltration, and extracellular matrix remodeling.[13] These results are consistent with Ayurvedic accounts of Kleda buildup and Srotorodha, indicating that Sthaulya is a complicated disease of fluid-fat interaction rather than just localized obesity.

While Meda and Kapha are at the heart of the development of Sthaulya, the regulatory function of Udaka and Kleda in promoting tissue growth and metabolic imbalance is still understudied. A more thorough assessment of these fluidic elements may offer an integrative perspective into the mechanistic understanding and therapeutic targeting of Sthaulya.

Sthaulya management in Ayurveda is fundamentally based on Apatarpana and qualitative reversal of Udaka-Kapha predominance. As described in Charaka Samhita management emphasizes Langhana, Rukshana, Lekhana, Deepana, and Vyayama to counteract Guru, Snigdha, and Drava attributes.[14] Restoration of Agni reduces pathological Kleda formation, while

Lekhana and Udvartana dismantle Meda consolidation. Srotoshodhana alleviates Abhishyandana, improving metabolic

flow. Thus, Sthaulya Chikitsa systematically reduces excessive Udaka, clears Medovaha Srotas, and re-establishes Dosha-Dhatu

balance, restoring structural and functional equilibrium within the classical Ayurvedic paradigm.[15]

2. MATERIAL AND METHODS

2.1 Study Methodology

With doctrinal synthesis, this study was conducted using the traditional Ayurvedic textual analytical review method (Shastriya Grantha Adhyayana). The goal was to systematically analyze key Ayurvedic texts and their authoritative commentaries in order to understand Udaka's role in the cause and treatment of Sthaulya. A qualitative hermeneutical approach with conceptual mapping of Samprapti components was used in the study.

Primary Source Documents Among the main written sources analyzed were: Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, WHO sources, Pubmed, systemics reviews, meta analytical studies to incorporate modern and classical understanding. To guarantee interpretative accuracy, standard critical editions with classical commentaries (such as Chakrapani, Dalhana, and Arunadatta) were examined.

Reviewed Textual Portions The following Sthanas and Adhyayas were methodically investigated. A methodical approach to manual searches was used. Identification of essential conceptual terms: Udaka, Mahabhuta, Kleda, Meda, Obesity, Santarpanajanya, Agnimandya, Srotorodha, Abhishyandana. Guna Viparyaya Siddhanta (the oppositional quality principle) was used to examine the principles of treatment. Against the dominance of Udaka, the healing interaction of Drava, Snigdha, and Guru qualities was mapped. This study did not include any human or animal participants. It was just a textual analysis of classic literature. As a result, formal ethical approval from institutions was not required.

3. DISCUSSION

Udaka, the functional expression of Ap mahabhuta, possess intrinsic qualities of fluidity, unctuousness, softness, viscosity and cohesion. Physiologically regulated udaka sustains Dhatu integrity; however, when qualitatively in excess, it becomes a central pathogenic driver in Santarpanotha Vyadhi. Overfeeding and Agnimandya are the main causes of obesity. According to Charaka Samhita, Meda Vriddhi is encouraged by Ati Madhura, Ati Snigdha Ahara, Avyayama, and Divasvapna.[16] The majority of these causal factors exacerbate Ap-Kapha. The conversion of Rasa Dhatu is hindered when Agni becomes Manda, which results in higher Kleda output. In this instance, Udaka acts as a pathological amplifier rather than a passive substrate. Its Drava and Snigdha characteristics improve tissue hydration beyond physiological boundaries, resulting in a Kleda-rich environment within. The occurrence of channel saturation and obstruction known as Abhishyandana is brought about by an excess of Kleda. Consequently, the Medovaha Srotas are in danger. In Sthaulya, excessive Meda wraps around anatomical pathways ("Medasāvṛuta Marga"), signaling blockage caused by fluid-rich adipose expansion.[17] Additionally, Udaka's Bandhana site promotes the structural integration of too much Meda. The characteristics of Sthaulya—Chala Sphika-Udara-Stana—which are soft, flexible, and big, are a representation of Ap-dominant

tissue. Udaka maintains a self-reinforcing cycle by suppressing Agni and fostering the dominance of Snigdha-Guru: Santarpana → Agnimandya → Kleda Vriddhi → Meda Abhivridhi → Srotorodha → Further Agnimandya.

Hence, in traditional Ayurvedic theory, **Udaka functions as a qualitative amplifier in Sthaulya pathogenesis**, enhancing Kleda accumulation, maintaining Meda proliferation, and

prolonging metabolic blockage until restorative Rukshana and Langhana treatments are initiated.

Kleda as the fundamental moisture in the body that helps in hydration, plays essential role in digestion (as kledaka kapha), and plays key role in cellular metabolism.[18] The excessive moistening and saturation impact inside Dhatus caused by heightened Ap dominance is represented by Kleda. Although it is physiologically necessary for tissue lubrication, its pathological increase turns it into a disease-promoting factor. Poor digestion and disrupted metabolic timing cause a derangement of Rasa and Mala, along with an excessive buildup of fluid, which is a sign of Kleda excess.[19] In Sthaulya, Santarpana and Agnimandya boost Kapha and Ap attributes, resulting in greater Kleda synthesis. Kleda's Guru, Snigdha, and Bahu Drava qualities encourage Abhishyandana, which is a condition of channel saturation and blockage. Due to this Abhishyandi character, Meda accumulates in the Medovaha Srotas, which slows down the metabolism of nutrients and Dhatus.[20] As a result, Kleda serves as a biochemical intermediary between Udaka surplus and structural Meda enlargement. By making tissue softer, more viscous, and more cohesive, it prepares the internal environment for adipose proliferation. Med Vriddhi cannot be maintained without Kleda enhancement. As a result, in the pathogenesis of Sthaulya, Kleda is the dynamic pathological stage where fluid dominance transforms into actual Dhatus overgrowth and Srotorodha.[21]

The formation of Meda Dhatus in Sthaulya is not an isolated structural occurrence but rather the result of a qualitative fluid dominance mediated by Udaka and Kleda. Udaka creates an interior environment high in fluids. Due to Kapha being worsened by Santarpanajanya Nidana, Agni becomes Manda, which results in impaired Rasa conversion. This metabolic dysfunction increases Kleda synthesis. Dhatus are saturated by Kleda, and this encourages Abhishyandana.[22] This kind of tissue saturation provides the best environment for selective Meda nutrition. In normal physiology, balanced Dhatus is necessary for the sequential conversion of Dhatus. But when Kleda prevails, Meda Dhatus—which is naturally Kapha-Ap dominant—gets an excessive amount of nourishment. In Sthaulya, Meda accumulates excessively and surrounds channels ("Medasāvruta Marga"), which points to structural overextension. Kleda provides pathological saturation, Udaka offers the fundamental substrate, and together they combine to form Meda Bahulya. By disrupting Agni and Srotas patency, the Snigdha-Drava continuum simultaneously stabilizes fat formation. As a result, Meda production in Sthaulya signifies the structural crystallization of chronic Udaka excess mediated by Kleda, resulting in metabolic blockage and excessive Dhatus growth.

Role of Udaka in Management of Sthaulya

The foundation of Sthaulya's management, as detailed in Charaka Samhita, is based on the principles of Apatarpana and Langhana. [23] The therapeutic approach aims to qualitatively counteract the Drava, Snigdha, Guru, and Picchila characteristics, which are intrinsic to Udaka. Therefore, systematic regulation and reduction of pathological Udaka can be seen as a doctrinal interpretation of Sthaulya Chikitsa.

Langhana is necessary for treating illnesses brought on by excessive nutrition. Langhana lightens the body and rekindle

Agni, reduces Kleda production, which is immediately related to an overabundance of Udaka.[24] By Kleda saturation, Udaka enhances Meda, and controlled depletion reduces the dominance of internal fluid, bringing the metabolism back into equilibrium. Thus, Langhana serves as the initial corrective step in counteracting Udaka-mediated pathology.

The focus of obesity management is Rukshana treatment. The following remedies are recommended in the Charaka Samhita: Ruksha, Tikshna, Ushna, Katu-Kashaya. Sneha and Dravata, two

of Udaka's most fundamental characteristics, are in direct conflict with Rukshana. Rukshana reduces pathological Kleda and destabilizes excessive Meda consolidation by causing dryness and lowering tissue unctuousness.[25] The therapeutic foundation of Sthaulya Chikitsa is based on this qualitative opposition (Guna Viparyaya Siddhanta).

Lekhana Dravya are indication for reduction of meda. This occurs by scraping of excess meda, reducing picchilata, and promoting srotoshuddhi.[26] Since Udaka bandhan properties facilitate meda consolidation, lekha disrupts this cohesion expansion. Hence it represents interventions that acts against Udaka stabilized adipose overgrowth.

The first cause of Sthaulya is Mandagni[27]. Due to the antagonistic Drava-Tejas interaction, Udaka inhibits Agni. Hence, it is vital to use Deepana-Pachana treatment. Through restoration Jatharagni, the sense of taste is normalized, the output of kleda is diminished, Meda becomes proportional. It is impossible to reduce Udaka excess sustainably without first addressing Agni. As a result, reversing fluid-dominant pathology requires Deepana.

From a purely Ayurvedic perspective, the treatment of Sthaulya is based on controlling abnormal Udaka excess. Classical treatments methodically reverse the fluid-amplified metabolic distortion by lowering Kleda, breaking up Meda consolidation, bringing back Agni, and cleaning up Srotas. As a result, Udaka is not just involved in the genesis of disease; rather, it develops into the main qualitative goal of therapeutic intervention. Within the traditional Ayurvedic paradigm, restoring balanced Udaka restores metabolic balance and Dosha-Dhatus-Mala harmony.

5. RESULTS

A current textual study of ancient Ayurvedic writings reveals a consistent doctrinal connection between Udaka, Kleda, Meda, and Sthaulya. Ap Mahabhuta, through its manifestation as Udaka, controls Dravata, Sneha, and Bandhana, which are essential for tissue cohesion and fluid regulation. According to textual synthesis, Santarpanajanya Nidana causes excessive Kleda production, which in turn causes Agnimandya. Due to its Guru, Snigdha, and Bahu Drava characteristics, Kleda causes Abhishyandana and Srotorodha, especially within the Medovaha Srotas. In this environment, the body prioritizes the nourishment of the Meda Dhatus and its structural integration. Additional research supports the idea that Meda Vriddhi (or "Medasāvruta Marga") is the physical expression of a persistent Udaka-Kleda predominance. A self-perpetuating pathological model is created by the cyclical interaction between Agnimandya, Kleda buildup, Meda proliferation, and Srotorodha. Hence, the classical evidence supports the theory that Udaka operates in Sthaulya as a qualitative pathological amplifier, utilizing Kleda-mediated tissue saturation to foster Meda growth and systemic metabolic disbalance

6. CONCLUSION

The current analytical research offers a consistent Ayurvedic model that places Udaka as a key pathological amplifier in the onset of Sthaulya. Through its manifestation as Udaka, the Ap Mahabhuta controls basic qualities such as Dravata (fluidity), Sneha (unctuousness), Mardava (softness), and Bandhana (cohesion). Although anatomically essential, these same features start and maintain Kapha-dominant metabolic abnormalities when they are too much. Basically, qualitative and quantitative dietary excess leads to Sthaulya, which is categorized as one of the Ashta Nindita Purusha. The triggering event is Agnimandya, which is brought on by Ati Madhura, Ati Snigdha Ahara, Avyayama, and Divasvapna. The correct Rasa

conversion is disrupted by the suppression of Jatharagni, resulting in excessive Kleda production. The functional pathological link connecting elemental Udaka excess to structural Meda proliferation is represented by Kleda, which exhibits Guru, Snigdha, and Bahu Drava characteristics. Kleda is identified by the research as the active stage of tissue saturation. Its Abhishyandi character encourages Srotorodha, especially inside the Medovaha Srotas. This barrier hinders the process of Dhatu transformation and leads to the selective feeding of Meda. The conventional description of "Medasāvruta Marga" results from the disproportionate enlargement of Meda Dhatu, which is naturally Ap-Kapha dominant. This Ap-dominant structural and functional imbalance is reflected in the observable characteristics of Sthaulya. **A cyclical pathological sequence occurs: Santarpana → Agnimandya → Kleda Vriddhi → Meda Abhivridhi → Srotorodha → more Agnimandya.** In this continuum, Udaka functions as a qualitative intensifier that enhances Kleda accumulation and stabilizes Meda consolidation, rather than as a passive fluid substrate. Its Drava and Sneha qualities help to soften tissues, suppress Agni, and promote the cohesive growth of fatty tissues. As a result, Sthaulya is shown to be a metabolic dysregulation disorder with fluid amplification, rather than just a quantitative gain in adipose tissue. This paradigm supports the traditional focus on Langhana, Rukshana, Lekhana, and Agni Deepana as therapeutic methods for treating Udaka excess and lowering pathological Kleda. By restoring Agni, proper Dhatu transformation is re-established, Srotas are cleared, and the dynamics of Dosha, Dhatu, and Mala are brought back into equilibrium. The text evidence, in sum, favours a consistent doctrinal understanding: By encouraging Kleda buildup, enabling Meda expansion, and maintaining Srotorodha and metabolic imbalance, Udaka acts as a pathological amplifier in Sthaulya. The traditional Ayurvedic framework uses therapeutic remedies to address qualitative fluid overload and restore metabolic and systemic balance.

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