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Urine sediment (rasūb) as a diagnostic tool in nephrolithiasis (hasĀh Wa Raml Al-Kulya) in USM: A review

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Abstract
In USM the examination of urine (Bawl) holds a central role in diagnosing disease & provide valuable insights into the health of liver, vascular and systematic condition especially related to kidney & urinary tract.
Nephrolithiasis (hasāh al kulya) refers to the formation of crystalline deposits, commonly known as renal calculi, typically occurring within the kidneys. This condition is a growing urological concern, affecting approximately 12% of the general population globally. Unani classical texts are replete with detailed descriptions of (Hasāh al Kulya) including its etiology, pathophysiology, clinical features, and methods of diagnosis chief among them, urine analysis.
Urinalysis has historically served as a pivotal diagnostic tool, utilized by physicians from antiquity to the modern era. Notable contributions from pioneers such as Hippocrates, Aristotle, Galen, and Avicenna underscore the long-standing relevance of urine examination in disease detection. In Unani medicine, detailed observation of urine characteristics such as color (lawn) consistency (qiwam), safā fā t & kadurat (turbidity& clarity,) volume, (mī qdā r) froth(zū bda) Odor (boo) and the presence of sediment (Rasūb) offers valuable insights into the body's physiological and metabolic status.
Particularly, Rasūb (urinary sediment) is emphasized as a significant indicator in identifying the formation, presence, and excretion of renal calculi. This paper aims to explore the diagnostic significance of urine sediment in nephrolithiasis, aligning classical Unani principles with modern clinical understanding.

Keywords: Nephrolithiasis, hasāh al-kulya, rasūb, urinary sediment, urine analysis, unani medicine

Introduction
Nephrolithiasis, or Hasāh al kulya, is defined as the formation of stones due to crystallization of solutes present in the urine. These stones develop within the renal system commonly in the kidney, renal pelvis, or ureter and are composed of mineral and acid salt deposits. The condition affects approximately 12% of the global population [20] and is recognized as one of the most prevalent disorders of the renal system. The genesis of renal calculi is attributed to multiple pathophysiological mechanisms, among which supersaturation of solutes in urine plays a key role. Based on their mineral composition and underlying causes, kidney stones are classified into various types, such as calcium oxalate, uric acid, struvite, and cystine stones [12, 13].
In the Unani system, extensive documentation on Hasāh al Kulya exists, wherein urine analysis serves as a primary investigative modality. Urine is examined meticulously for various parameters including color (Lawn), clarity (Safāfat), consistency (QIWAM), froth, volume, odor and sediment (Rasūb). These parameters not only assist in diagnosing nephrolithiasis but also provide prognostic insights [1, 4, 5].
This study endeavors to highlight the diagnostic importance of urine examination particularly sediment analysis in the identification and understanding of renal calculi, within the conceptual framework of the Unani system of medicine.
Unani physicians have described the pathogenesis and diagnostic approach of this condition, which may provide valuable insights into understanding about nephrolithiasis and its diagnosis through Urine (bawl) as a diagnostic tool of USM mentioned in classical literature [4, 3, 9].

Pathogenesis of nephrolithiasis (hasĀh al kulya) in unani

In Unani medicine, the pathogenesis of nephrolithiasis (Hasāh al-Kulya) is explained through the complex interplay of humoral imbalances, deranged digestion, altered temperament (mizāj), and weakened renal faculties. The classical scholars of Unani Tibb, including Ali bin Abbas Majoosi, Jalinoos (Galen), and Razi, have detailed the aetiology and progression of renal stone formation through their understanding of the six essential factors (Asbāb-e-Sitta Zarūriya) and internal physiological dysfunctions [3, 11].

- **Role of Ḥarārat-e-Gharīziya (Innate Heat)**

According to Ali bin Abbas Majoosi, the innate heat (Ḥarārat-e-Gharīziya) of the kidneys plays a critical role in maintaining the normal state of renal functions. However, when this heat acts excessively on certain thick and adhesive humors (rutubāt-e-ghalīza wa lazdār), such as Balgham Ghalīz, Khoon, or Reem, it leads to dehydration and desiccation of these humors, forming a dry and viscous residue. This residue, being insoluble and adhesive in nature, gradually aggregates to form renal calculi (ḥaṣāh) [11-13, 15].

- **Humoral Imbalance and Diet**

Jalinoos (Galen) attributed stone formation to individuals who consume Ghalīz (viscous) and Radi' al-Kaymūs (poorly digestible) diets. These diets impair the digestive process, leading to Fuṭūr-e-Haḍm (dyspepsia). The resultant partially digested materials (madād) are unable to be transformed properly, leading to the formation of pathogenic rutubāt that precipitate in the kidneys as calculi [13, 14].

- **Decline in Renal Expulsive Power (Quwwat-e-Dāfiya):**

A major Unani explanation for the origin of renal stones lies in the decline of the expulsive faculty (Quwwat-e-Dāfiya) of the kidneys. This leads to a Sū'-e-Mizāj-e-Kulya (abnormal temperament of the kidney), making it incapable of fully expelling the waste. The residual waste materials undergo further transformation and settle as Rusūb-e-Ramlī (sandy sediments), which indicates the initial, active, or residual phase of stone formation [7-10].

- **Temperamental (Mizāj) Susceptibility**

The susceptibility to nephrolithiasis varies according to individual temperament (mizāj) and predominant humor (khiṭṭ):

- **Damvī Mizāj (Sanguine):** Most prone, due to increased vascular activity and heat.
- **Ṣafrāvī Mizāj (Choleric):** Moderately prone due to intense heat and dryness.
- **Balghamī Mizāj (Phlegmatic):** Less prone but still susceptible due to viscous phlegm.
- **Saudāvī Mizāj (Melancholic):** Least prone due to dryness and constriction, yet stones may form due to khushk balgham [2, 7].

- **Gender and Age Predisposition**

In classical Unani literature, males are more frequently affected than females, followed by children and elderly. This trend is attributed to anatomical, physiological, and hormonal differences affecting the formation and expulsion of sediments [12-14, 20].

- **Classical Description of Sediment (Rusūb)**

Zakariya Razi emphasized that colicky renal pain, urinary incontinence, and sandy sediments in urine (rusūb ramlī) are cardinal indicators of renal calculus. The sediments, especially red sandy grains, suggest active formation in the kidney (dominance of heat), while white sandy grains are typically of bladder origin. These sediments often resemble millet and act as precursors or dissolving remnants of renal stones [11, 12, 17-19].

Types of renal stones

1. 75% of stones formed are of calcium oxalate.
2. 15% triple stone composed of magnesium & ammonium phosphate.
3. 6% uric acid.
4. 1-2% cystine stone.

Clinical features

1. Colicky pain
2. Dysuria
3. Hydronephrosis
4. Tenderness in flank.

Risk Factor

1. Hypertension
2. Diabetes mellitus
3. Hyper calcemia
4. Parathyriodism

Material

The relevant information on urine as a diagnostic tool in nephrolithiasis which is available in scattered way in existing classical unani literature, journals, manuscripts.

Methods

Unani Diagnostic Correlate-Rusūb Ramlī as a Pathognomonic Sign:

The presence of sandy sediments (rusūb ramlī) in urine is considered the hallmark diagnostic criterion of Hasāh al-Kulya in Unani medicine. These sediments reflect the process of:

- Stone formation (Initiated Phase),
- Presence of stone (Active Phase), or
- Dissolution of stone (Resolution Phase).

Hence, careful observation of urine for lawn (color), qiwām (consistency), and rusūb (sediment) under sunlight was a standard practice among Unani physicians for diagnostic and prognostic insights. The term "sediment" (rusūb) gives the impression of any substance that settles. However, in USM, physician use the term rasūb, that is sediment or residue to describe substances that are denser and aaprear distinct compared with the urine, even if they are suspended or floating. Urine sediments are waste of haḍm-e-uruqi (vascular digestion) or haḍm-e-uzwi (tissue digestion).the nature, quality, quantity, form, position, time and admixture of sediments provide clues about the various state of the body [11, 19].

- "Rusū B-E-Ramli" is the characteristic tool of Urine (bawl) in diagnosis of nephrolithiasis (Hasāh al kulya) [11, 12].

- Rasū B-E-Ramli: (Sandy Sediments): They always indicate that the stone is formed, is still forming or is dissolved in the kidney or bladder. The red sandy sediment originate from the kidney, where as white sandy sediments originate from the bladder. Zakriya razi mentioned that red sandy sediment indicated the dominance of heat in kidneys. Another type of sediment, known as raml, is small and resembles millet grains. These sediments are loose, contains soft components, and act as precursor to stone formation.

Aims and Objectives

- To explore and validate the significance of urine (bawl), specially urine sediment
- (rasūb e ramli) as a diagnostic tool in nephrolithiasis (hasāh al kulya)
- To create an evidence that urine (bawl) is the diagnostic approach in diagnosing the formation, presence and dissolved renal calculi.

Results

This study reveals that urine analysis in evaluating nephrolithiasis especially through the RUSŪ B RAMLĪ as a characteristic tool.

Discussion

Urine analysis was an important diagnostic tool for diagnosis of nephrolithiasis at the time of Greek predecessors. They believed that urine most directly indicates the state of liver and condition of genitourinary organs. In USM Urine analysis was done by examination and observation of urine by naked eye directly under the sunlight, different features including color, density, transparency, sediments, volume, odour, taste and froth. Out of which sediment rasūb ramli was diagnosed which indicate impeding disease characteristically evaluated for the formation, presence & dissolving of renal calculi. Avicenna was one of the few pioneer who described urine analysis in scientific way similar to what customary in the 21th century. This technique used by Greek predecessors become popular not only in their times but still being accepted and widely in use.

Conclusion

From the above discussion it can be concluded that the oldest laboratory procedure used in the medicine is the inspection of urine for diagnosis of nephrolithiasis. This study/review can help us understand the definition, formation & importance of urine sediment (rusū b ramlī) in nephrolithiasis condition. Consequently the diagnosis, prognosis, and treatment based on the Unani doctrine becomes easier for the physician. Urine sediment (rusū b-ramlī) are among the least studied component and the present article is performing a detailed literature survey. It is concluded that urine sediment (rusū b ramlī) are the most significant parameters and the most significant parameter and an important tool in diagnosing & prognosis in nephrolithiasis in USM. This study reaffirms the relevance of this ancient diagnostic technique and suggest further observational research to clinically validate these traditional findings.

Conflict of Interest

Not available

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