

# Importance of Examination of *Rasūb* (Sediments) in Uroscopy

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## ABSTRACT

Uroscopy is the macroscopic examination of urine, and it is an important diagnostic tool in Unani medicine. The findings of uroscopy are linked with the humoral theory of medicine. Human Urine is the first fluid that was examined for medical purposes. There are seven parameters in uroscopy, each parameter is studied in detail and then the conclusion is drawn based on the findings of all. Examination of urinary sediments is one of the parameters in uroscopy. In urine, sediment is a denser and differentiable component from the watery constituent. The features of urinary sediment vary a lot in different physiological and pathological conditions of the body that are of medical importance. It is an evident fact that sediment makes up the solute component of urine, which is the waste product of hepatic digestion. One of these seven indicators that uroscopy analyses, is the inspection of urine sediment. The amount, color, homogeneity, position, and rate of sedimentation of the sediments are taken into account to ascertain the state of the body from them, and careful correlation is made with the results of other parameters.

**Keywords:** Urine, Urine sediment, Uroscopy, Unani medicine, Urinalysis

## INTRODUCTION

Uroscopy is the first documented laboratory test.<sup>[1]</sup> It is used in the Unani system of medicine for diagnostic and prognostic purposes. It is the macroscopic examination of urine and is linked with the humoral theory of medicine.<sup>[2,3,4]</sup> The term uroscopy is derived from the Greek word "uroscopia" which means scientific examination of urine.<sup>[5]</sup> The color, density, transparency, sediments, volume, odor, and froth of urine are analyzed in uroscopy.<sup>[6]</sup> Some scholars recommended the use of taste and touch for evaluation of urine but Ibn Sina objected to it.<sup>[7,8]</sup> Hence *Rasūb* [sediments] is one of the important parameters of uroscopy. There are two types of *Rasūb*, one is *Rasūb Maḥmūd* [normal sediments] and another is *Ghayr-Maḥmūd* [abnormal sediments].<sup>[9,10]</sup>

## MATERIALS & METHODS

Classical Unani sources like *Al-qanun fil Tib* [Canon of Medicine], *Kitab-ul-Mansoori*, *Kulliyat-e-Nafisi*, *Zakhira khawarazm shahi*, *Firdosul-hikmat* etc. are reviewed. Different search engines were browsed on the website to explore recent studies. Other than the above, the present work is an attempt to analyze the importance of urine sediments in view of Unani physicians.

**Urine formation:** According to humoral theory, the ingested food material undergoes four sequential stages of digestion until it becomes a part of the body.<sup>[11,12]</sup> At every stage of digestion, some waste product is formed which is excreted from the body. Urine is the waste product of the 2<sup>nd</sup> stage i.e. hepatic digestion. The first stage of digestion is gastric digestion, which takes place in the alimentary canal. The useful product of this stage is chyme [kaylūs], which is absorbed by vessels of the alimentary canal, and the waste product is excreted as feces.<sup>[13]</sup> The 2<sup>nd</sup> stage of digestion is hepatic digestion, which takes place in the liver. The useful product of this stage is humors [Akhlāt], which flow in blood vessels and urine is the waste product of this stage, which is excreted through the urinary tract. The humors are further digested in the blood vessels which is 3<sup>rd</sup> stage of digestion called vascular digestion. The final stage of digestion [4<sup>th</sup> stage], which takes place in tissues [Ada mufarda] is called organ digestion and finally food material becomes part of the body. The waste products of the 3<sup>rd</sup> and 4<sup>th</sup> stage of digestion are mainly excreted through the skin in the form of sweat but it may also be excreted in the urine. Waste from tissues and the urinary system is also excreted in the urine.<sup>[9,12,14,15]</sup> Joannes Actuarius [1275–1328] described urinary sediments based on four elemental theory. Among these, fire and air being lighter elements rise on the top whereas the heaviest element i.e., earth sinks to the bottom of the vessel.<sup>[16]</sup>

**Sediments [Rasūb]:** It is the solute constituent of urine. Anything denser and differentiable from the watery constituent of urine is called sediment. It may occur anywhere in urine. It may sink at the bottom of the vessel or float on the surface of urine or may be suspended in between. Sediment differs from turbidity as these particles are readily visible, whereas particles cannot be distinguished in the case of turbidity.<sup>[7]</sup> The amount, color, odor, rate of sedimentation, position, composition, coherence, and consistency of sediments are of medical

importance. There are two basic types of sediments, one is normal [Maḥmūd] and another is abnormal [Ghayr-Maḥmūd].<sup>[17,18]</sup> Normal sediment gives evidence of normal digestion, and optimum concoction [nuḍj].<sup>[19]</sup> Particles of Normal sediment are whitish, smooth, rounded, delicate, uniform, homogeneous with rounded contour, present in close proximity to each other, and settled at the bottom of the vessel. If the normal properties of sediments get deviated, it is considered abnormal which denotes abnormal metabolism, faulty digestive process, and pathological conditions. In sediment analysis, amount, color, odor, consistency, position, composition, structure, and rate of sedimentation are of diagnostic significance.<sup>[9,20,21]</sup> For sediment examination urine should be taken in a wide mouth, round base glass container and left in it for 3-10 hours for sedimentation.<sup>[14]</sup> Sediment can also be separated by centrifuging the urine sample.<sup>[4]</sup>

**Amount:** The urinary sediment is scanty in thin people and abundant in obese. It is also abundant in individuals with bad habits or sedentary lifestyles as compared to individuals with an active lifestyle. Urinary sediment is more abundant in females than males and children than adults.<sup>[7]</sup>

**Color:** The color of sediment may or may not be the same as the color of urine. If it differs from the color of urine, it is considered a better one, if white followed by red, then lemon-yellow or saffron-yellow, and the least good is like arsenicum in color or that of lentils. Yellow-colored sediment is due to yellow bile from the hepatobiliary system and denotes great heat or insidious disease. Red-colored sediment shows the dominance of sanguineous humour. It occurs in faulty digestion and fasting. The long continuance of red urinary sediments indicates inflammation of the liver.<sup>[1]</sup> White sediment is generally good but if it is mucoid, ichorous, or foamy, it is a bad sign and indicates that the urine is not completely secreted. Black sediments are considered a bad sign. Ali Ibn al-Abbas has said that it is a fatal sign if it comes on after

being intensely red. Black sediment which settles at the bottom of the vessel or floats like nubecula denotes near death.<sup>[7,14,22]</sup>

**Homogeneity:** Homogeneity of sediment is a more important feature than color because homogeneity is always related to maturation. Homogeneous sediment even though not altogether white, or even reddish in shade, is a better sign compared to the sediment which is white but heterogeneous, and composed of coarse particles. Particles of good sediment are finely textured, round-shaped, uniform in size, and are not discrete. Heterogeneous or discrete particles denote impaired digestion or flatulence.<sup>[9,23]</sup>

**Position:** Based on the position of sediments in vessels, it is of three types - Rasūb-e- Rasib [shrinkable], Ghomām [nubecula], and Moallaq [hovering]. Rasūb-e- Rasib are those urinary sediments that settle at the bottom of vessels. Ghomām sediments float at the surface of urine. Moallaq are those that are suspended in the urine, they neither float at the surface nor shrink at the bottom. A nubecula or suspended sediments rarely appear in an illness of a slender person. Spider-web-like suspended sediments are an ominous sign. Homogeneous sediments settled at the bottom of the vessel is a sign of good maturation and perfect digestion. A higher position of sediments in vessels denotes gradually decreasing maturation.<sup>[14,19]</sup>

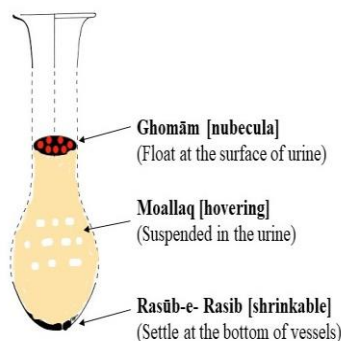


Figure 1. Three types of sediments, based on the position in vessels

**Sedimentation:** Normal sediments are homogenous and Arđi [earthy] in nature and

thus have a tendency to get settled at the bottom of vessels. These do not disperse throughout the vessel unless intervened by some other factors like air. A rapid rate of sedimentation is a good sign and indicates correct maturation otherwise maturation is deficient or absent.<sup>[7]</sup>

**Varieties of abnormal sediments:** Based on composition there are ten varieties of abnormal sediments.<sup>[9,20,24]</sup> These are as follows:

**1. Flaky or Squamous [Kharati]:** It comes from urinary organs. It is composed of red or white large particles. Red or fleshy sediments come from the kidney while whitish flaky sediments indicate ulceration or erosion of the urinary bladder.<sup>[22]</sup> Flaky sediments of brown or dark color or resembling the scales of fishes, suggest the shedding of mucus lining and are considered as very bad signs. If sediments are derived from the kidney, then its particles are more homogenous and fleshier while sediments derived from the liver or blood are friable. Sediments of hepatic origin are dusky red while sediments of renal origin are yellowish. But sometimes sediments of hepatic origin may resemble sediments of renal origin. Scaly sediments like a husk or hulls of grain denote bladder trouble or colliquative disorder of organs, which can be detected as a sense of itching at the root of the penis with foul-smelling urine especially if the pus discharge occurs before micturition, it denotes bladder trouble.<sup>[22]</sup> In case of colliquative disorder of organs, there is fever, weakness, and dysuria with brownish sediments. Another sediment of a coarse particle like barley flour denotes one of the four conditions: (I) If sediment is reddish, it denotes oxidation of sanguineous humour. (II) If this sediment is whitish, it denotes a colliquative disorder of organs. (III) Bladder disorder [if another supporting sign is present]. (IV) If the color of

sediments approaches black, it is a sign of oxidation of blood, especially in the spleen. Squamous sediments other than renal or vesical and urethral origin denote severe acute diseases.<sup>[7,23]</sup>

2. **Fleshy sediment [Lehmi]:** These are usually of renal origin with other signs of renal disorder or if not so, then this sediment is healthy without any breakdown in the body. If evidence of good digestion is present in urine, then it denotes healthy blood vessels.<sup>[11]</sup>
3. **Fatty sediment:** These sediments are the result of colliquative disorder in the body. Fatty sediments resembling gold water, are fatal. An abundant amount of this sediment with discrete particles is derived from renal sources whereas a scanty amount of sediments with admixed particles is derived from more distant organs. A pomegranate-like white particle of sediments is derived from the kidney. Purulent sediment denotes discharge from the wound of the urinary tract.<sup>[9]</sup>
4. **Mucoid or Slimy sediment:** This sediment denotes any of the following four conditions, (I) Plenty immature humour in body. (II) Unnatural accumulation of immature humor in the urinary tract. (III) Intense cold distemperament of kidneys. (IV) Abundant mucoid sediment in case of sciatica or joint pain is a good sign, indicative of buhraan [crisis] and the patient gets relief from disease.<sup>[7,23]</sup>
5. **Purulent [Ichorous] sediment:** It is thoroughly intermixed in urine. It is a sign of abases in the urinary tract. Its particles easily aggregate on repose and easily disperse on stirring. It may separate quickly. Whereas crude sediment is turbid and thick, it neither aggregates easily nor disperses quickly, and urine is also not fetid.<sup>[9,22]</sup>
6. **Hair-like sediment:** This sediment is produced by the coagulation of thick liquid under the influence of heat. This sediment originates in the kidney or in narrow vessels. It may be white or red

in color. It is hair-like and may be up to half a meter long. Thread floating in urine denotes post-coital micturition.<sup>[7]</sup>

7. **Sediment resembling pieces of yeast infused in water [Rasūb Khamiri]:** This sediment is due to deprived digestion and gives evidence of gastrointestinal weakness. Often this sediment is due to the intake of milk, curd, or cheese.<sup>[9]</sup>
8. **Sandy or Gritty sediment:** This is the sign of calculi in the urinary tract. Red gritty sediment is of renal origin while white sediments come from the urinary bladder. According to Hippocrates, in case of fever, gritty sediments of large size like ground grain are a bad sign.<sup>[11,25]</sup>
9. **Cineritial sediment:** This indicates that serous humour or pus has changed its color due to prolonged stagnation and oxidation.<sup>[7]</sup>
10. **Hirudiniform sediment:** This sediment resembles red leeches in appearance. A well-mingled hirudiniform sediment with urine denotes hepatic insufficiency; loosely mingled sediments denote trauma of the urinary tract and breach in the continuity of its lining. Discrete hirudiniform sediment indicates a lesion of the urinary bladder or urethra. Red leech-like sediments in urine with evidence of disease in the spleen denote a destructive disease of that organ.<sup>[22,25]</sup>

## DISCUSSION

Uroscopy is the earliest laboratory test in medicine. In the Arabic text of medicine, the term used for uroscopy is tafsira meaning inspection, because it guides towards the patient's condition.<sup>[7]</sup> Urine is the waste product of hepatic digestion but the waste product of vascular and organ digestion may also be excreted in urine. There are seven parameters considered for analysis in uroscopy. Inspection of sediment is one of these seven parameters.<sup>[25,26]</sup> To determine the state of the body from the sediments, its amount, color, homogeneity, position, and rate of sedimentation are taken

into consideration and careful correlation is made with the finding of other parameters.<sup>[7,27]</sup> The final remark of uroscopy is drawn by analyzing the finding of all parameters.<sup>[28,29,30]</sup> Like sandy or gritty sediment is an indication of calculi in the urinary system but without dark urine, it can also be evidence of renal calculus. If sediments are suspended in different layers in limpid urine, it denotes headache and wakefulness. Uroscopist must be aware of the normal changes in urine during different physiological conditions, like age, and sex. He must also consider different conditions which produce a similar appearance in urine.<sup>[9]</sup> The final remark of uroscopy must be correlated with clinical manifestation. To make the diagnosis, the comparative study of other diagnostic tools like pulse and temperament of a patient must also be considered.

## CONCLUSION

Uroscopy is an important diagnostic test in Unani medicine. To draw a precise conclusion from uroscopy the examination of urinary sediments is of paramount importance. The amount, color, homogeneity, position, and sedimentation of urinary sediment denote the medical condition of the body. There are 10 types of abnormal sediments, each denoting a different pathological condition and having its diagnostic importance.

### Declaration by Authors

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