



Urinalysis: A Diagnostic Tool in Unani System of Medicine

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ABSTRACT

Urinalysis (Uroscopy) is a diagnostic tool used by physicians from the ancient time to till date. Evidence of this diagnostic tool can be found in the works of Hippocrates, Aristotle, Galen, Avicenna and few others. Urine is the waste of *Hadm Kabidi wa Uruqi* (all digestive processes occurring inside liver and vessels). Careful inspection of the urine will yield much information about many physiological functions and metabolic processes of the body, but directly indicates the state of the liver and condition of the urinary tracts and related organs, their passages and vessels. Urine also provides some information about other systems and organs. It helps in diagnosis of various pathological conditions of the body.

Key Words: Urinalysis; Uroscopy; Unani System of Medicine; Diagnosis.

INTRODUCTION

According to available Ancient literature Hippocrates (460-377 BC) described Uroscopy for the first time. Hippocrates hypothesized that Urine is filtrate from blood through the kidney. [1] After the 6th century Galen (AD 129-200) gave a hypothesis that "Urine is manifesting the health of liver, the organ where blood was supposed to be produced. [2] In middle ages, Urine was considered first bodily fluid to be examined and has been explained in detail by two eminent predecessors Zakariya Razi (Rhazes 865-925 AD) and Ibn Sina (Avicenna 980-1037 AD). [3]

Urinalysis is considered to be the third common diagnostic laboratory test. [4] Although urine analysis has changed its scenario in terms of instruments used but still observation and examination of the urine holds its importance. Medical notes, from several thousand years ago, have revealed that examination and observation of Urine was the first tool for diagnosis of illness and management of patients. [3] They

believed that Urine examination could be helpful in medical judgement and determination of individual temperament. [5] In this regard, Urine should be taken as whole sample in a specially shaped glass jar called Matula [6] to have a more reliable observation. Moreover sampling should be done in the morning after a moderate night sleep while the person is still, fasting and examined within 1 to 6 hours. Different features, including colour, density, transparency, sediments, volume, odour, taste and froth are evaluated. [5] Avicenna was one of few pioneers who performed urinalysis in scientific manner very similar to what is customary in the 21st century. The technique used by him became popular not only in his times but still being accepted and widely in use.

MATERIALS AND METHODS

The relevant information on Urinalysis which is available in scattered way in existing classical Unani (*Greeco-*

Arab) literature, periodicals, journals and manuscripts were collected, analyzed and systematized into comprehensive manner. Avicenna suggested Preliminaries before Urinalysis [7]

- Voided urine sample in the morning.
- The patient should not eat or drink for a long time before examination (from the night prior to examination).
- The patient should not take any food or drugs that could change the colour of the urine such as the beetroot or Saffron.
- He pointed out some various artefacts and determined that external use of some colouring herbs like henna can change the colour of urine. [8,9]
- Urine should be examined as soon as possible after voiding as it would not be useful for examination after six hours. If the urine examined later, the colour would change and the foam, if present, would disappear. [3,8]
- Examination shouldn't be carried out at once but after the urine has been allowed to settle for some time,

Methods of Urine Examination [10]

Urine glass should be clear and colourless and must be thoroughly washed before use. Urine should be kept in a place, not too cold or hot, away from wind and sunlight. Specimen should be examined from both near and far. The observation and examination of urine is based upon urine colour, density, turbidity or transparency, sediment, quantity, odour and froth. Razi suggests, in examination of urine apart from clarity, colour, sediment and consistency, it is important to touching and tasting the urine. [3]

Colour:

Avicenna explained that changes in the urine colour could indicate the pathology in different parts of the body; the urine colour might change in a patient with headache, insomnia, deafness and abnormal mentality. He divided urine into 5 types on the basis of colour;

- *Zard* (Yellow)

- *Surkh* (Red)
- *Sabz* (Green)
- *Siyah* (Black)
- *Safed* (White)

On contrary Masihi holds on the fact that on the basis of types of *Akhlāt*, there are only four types of Urine; *Zard*, *Surkh*, *Safed* and *Siyah* and the remaining *Sabz Qaroorah* is actually *Murakkab* in colour. [11] Shaikh Ibn Sina divided *Zard qaroorah* further as, *Bawl Tabni* (straw colour), *Bawl Utarji* (citron yellow), *Bawl Ashqar*, *Bawl Asfar Naranji* (orange), *Bawl Nari* (Flame red) and *Bawl Zafrani* (saffron). All shades of yellow urine indicate some degree of heat, over activity, pain, starvation and insufficient fluids. [10]

Next to the yellow red colour has 4 shades; *Ashab* (pink), *Wardi* (rosy), *Ahmar qani* (vermillion) and *Ahmar Aqtam* (smoky red). All colours point to the dominance of blood and increment of *Hararat*. A bright yellow or flame coloured urine against the *Ahmar Aqtam* (smoky red), points to more heat as brightness is the result of bile while smokiness is due to blood. Acute fevers with high temperature are generally due to excess of bile that is why, urine becomes saffron or flame yellow in colour. When urine begins to turn red in acute diseases and stays so without forming sediment, it is an ominous sign because it points to an inflammatory swelling in the kidneys. If such urine becomes turbid, and stays so, it points to an inflammatory mass in the Liver, with lack of innate heat. [12] In case of jaundice urine is often so red that it turns dark and stains the linen; in such cases the prognosis is good. If the colour of urine in severe jaundice is pale-white or is slightly reddish there is a danger of developing ascites. [10,13] In *kulliyat Nafisi*, Allama Burhanuddin Nafees mentioned that in spite of *Barid* disease i.e. *Falij* (paralysis), the colour of urine is red. Red coloured urine also present in *Su-ul-qeeniya* (anaemia) and *Qolanj barid* (cold colic). [11] Red urine is a bad sign in kidney diseases because it indicates a "hot inflammatory process". [8]

Red urine which is persistently turbid is an indication of inflammation in the liver and weak *Hararat Ghariziya* (innate heat). In the book, the kidney and bladder stone, Razi explains that if blood comes out before urine it mean there is an ulcer in urethra. While when urine is red and suddenly patient develops difficulties passing urine it means that there is a clot inside the bladder and in order to help the patient that clot has to be dissolved. [3]

Sabz qaroorah (Green urine)

There are various types of green urine which are described by Unani Scholars such as *Fastaqi sabz* (pistachio green), *Zanjari* (verdigris green), *Neelji* (emerald-green), *Aasmanjubi* (sky-green/leek-green). All shades of green except verdigris and leek green denote extreme combustion. *Fastaqi* indicates a cold temperament. In children *Fastaqi* and *Neelji* urine is a sign of *Tashannuj* (spasm). [11] Sky green colour of urine is a sign of severe cold but according to some it is a sign of poisoning too. [10]

Siyah qaroorah (Black Urine): There are three main causes of black colour urine:

- Due to combustion of *Safra* (yellow Bile)
- Due to combustion of *Dam* (blood)
- It occurs due to abnormal *Sauda* (black bile)

Dark urine with a strong smell points to predominance of heat while a faint odour indicates cold temperament. When dark coloured urine comes after reddish shade in *Hummiyat hadda* (acute fever), it is a sign of danger. [13] Sometimes, urine is dark owing to the *Buhran* (crisis) in which evacuation of dark poisonous matter takes place e.g. at the termination of quartan fever, in the resolution of splenic diseases, on relief from diseases of back and uterus and in fever due to *Sauda* (black bile). Urine becomes dark also on the return of missed periods and on being relieved of the obstructed bleeding piles, and in this is

especially when a diuretic or an emmenagogue has been taken. Occasionally in amenorrhoea urine becomes dark from the elimination of excrements. [13,14]

If in acute illness, urine becomes dark without any critical evacuation it is a sign of bad prognosis as it generally indicates destruction of humours from the excess of heat (metabolic activity). Greater the turbidity of this type of urine, worse prognosis and clearer the urine more favourable for the prognosis. When Dark urine is passed during headache, sleeplessness, deafness or disturbance of brain, it is warning of epistaxis. Dark and thin urine is a sign kidney stone. According to Rofas, the dark colour urine is a good sign in kidney, urinary bladder diseases and in severe disturbance in body humours. [14] Dark urine passed in fatigue or after exertion is a sign of developing *Tashannuj* (spasm).

Safed qaroorah (white urine):

On the basis of transparency, whiteness it is of two types;

1. *Abyaz haqeeqi*: absolutely white like milk indicates presence of *balgham* (phlegm).
2. *Abyaz mushif*: Thin and transparent denotes coldness of temperament and defective maturation.

White urine is of the following seven varieties:

1. *Mukhati* (mucilaginous urine) which contains immature phlegm
2. Oily urine, which contains emulsified fat derived from tissues
3. Waxy urine, which contains phlegm from the actual or threatened dissolution of tissues
4. *Fuqqayi* (straw like) urine is thin
5. *Mani* (white like semen) like urine
6. Lead white urine
7. *Labni* (milky urine).

When semen like urine is passed in early stage of disease and not at the time of *Buhran* (crisis), it indicates the onset of apoplexy or paralysis. Milky urine in course

of acute fever is a fatal sign. In acute fevers, white urine, which was previously high-coloured, indicates diversion of bile either towards the inflamed organ or towards the bowels. If during the fever initially urine is thin but later on suddenly becomes white, mental disturbances are likely to develop. In acute fever, olive oil coloured urine is a warning of impending death or development of tuberculosis. Sometimes the urine during the early stage of disease is light but later on becomes dark and offensive as in case of jaundice. [10]

Density: [10]

According to density urine can be dilute, concentrated and moderate

A. Diluted Urine: If urine is too dilute than the normal, we should consider one of these four:

- Immature (not ripened)
- Occlusion of the vessels (narrow renal blood vessels)
- Renal failure in children with fever; if urine continues to be very dilute, renal insufficiency is indicated
- Intake fluid in large quantity

B. Concentrated urine: if urine is too concentrated, it might be due to lack of proper concoction or due to concoction of thick mucus that will be followed by high grade fever. Concentrated urine in severe illnesses indicates poor prognosis. If the urine of someone who appears to be healthy became concentrated, it means that soon a fever will develop. In healthy people, concentrated urine can be due to dehydration.

C. Moderation of urinary concentration means urine is mature and concocted.

When the urine is thick but not yellow it denotes the presence of white glassy phlegm which is sometimes observed in Epileptic conditions

Turbidity:

Turbidity results from the admixture of *Reeh* (air) with the earthy particles of liquid urine. Cloudy urine is usually due to

renal failure. It is said that if there is a foggy smoky appearance in bottom of urine, the prognosis is poor and usually death will occur after long standing illness. The turbidity of urine may be due to elimination of obstructive material from the liver or its adjoining tissues. In some cases, urine is highly turbid like urine of cattle or donkeys, and this turbidity is due to the derangement of humours, especially the formation of thick *Reeh* (air) from a immature phlegm by heat, this indicates already presence of headache. [10]

Odour:

Sweat smelling urine suggests dominance of the *Damvi khilt* (sanguineous humour) in urine. Pungent smell denotes excess of bile while sour (acidic) smell represents dominance of *Sauda* (black bile). A foul smelling odour with signs of maturation in the urine indicates ulcers in the urinary passages or scabies. [12] In the course of an acute febrile disease urine is foul smelling without evidence of ulceration in the urinary passage; it is a sign of bad prognosis. Foul smelling urine in an apparently healthy person is a sign of developing putrefactive fever, if this type of urine becomes sour; it indicates that there is putrefaction of *barid akhlat* (cold humours) by the extraneous heat. [10,12] As per Canon of Medicine, "Odourless black colour urine is a sign of *barid mizaj* (cold temperament)". If in case of acute diseases, odour vanishes which present previously, suggests impairment of *Quwa* (power). [14] Avicenna described that malodorous urine accompanied by itching and pain around the bladder and purulent urine are the signs of bladder pustules. [15]

Froth: Froth is due to the admixture of *reeh* (air) in the liquid urine during micturition. Bubbles of *reeh* (air) are large as in case of patients suffering from excessive distension. The points to be noted about the froth are;

- Colour: dark or orange coloured froth indicates jaundice.

- Quality: bubbles being large, coarse, fine or small.
- Quantity: excess of foam points to excess of *reeh* (air).
- Persistence of froth shows that the eliminated matter is viscid. Increased viscosity of urine is a bad sign in kidney diseases as it shows that abnormal phlegm or *sauda* is present in the system.

Sediments/Dregs: ^[10]

The nature, quality, quantity, form, position, time and amalgamation of sediment of urine provide so much valuable information about the various states of the body. There are two major types of sediments;

- Natural sediment: White in color, smooth, round, regular, light, settles at the bottom and consists of uniform particles. When the nature of a normal dregs is good and desirable, indicates maturity and concoction of urine, it is homogenous, white in color and soft. Occasionally in the presence of pus the sediment is white in color, but not homogenous and pulpy (soft). Different bad kind of sediment are lentil form, it is better that this type of sediment be dispersed and not to have plane level.
- Abnormal Sediments: There are 7 types of Abnormal sediments; (1) Flaky, (2) Fleshy, (3) Fatty, (4) Mucoïd or Slimmy, (5) Purulent, (6) Hair like, (7) Resembling Pieces of yeast infused in water, (8) Sandy or Gritty, (9) Ashy and (10) Hirudiniform.
 1. **Rasoob Kharati (flaky):** Red or white in colour. If it is red, it come from bladder and if red or fleshy then come from kidney. Dusky red sediments are the sign of hepatic disorder. Squamous deposits other than those of vesicle or renal and urethral origin, occurring in acute diseases have a grave significance.
 2. **Rasoob Lahmi (Fleshy):** usually of renal origin.

3. **Rasoob Wasmi (Fatty):** Two chief types; 1. Abundant and discrete (derived from renal fat) and 2. Scanty and admixed (derived from fat of distant place). When the sediments sinks promptly, it indicates Urethral sinuous (pus discharge) ulcer.
4. **Rasoob Mukhati (mucoïd sediments):** denote unnatural humour, which is plentiful in the body and passes out by the urinary tract. It may denote that there is very cold temperament of the kidney. A very mucoïd and abundant sediment appearing at the end of an attack of gout arthritis is a good sign.
5. **Rasoob Middi(ichorous sediment):** This has foul smell; preceded by the evidences of abscess.
6. **Rasoob shayari (Hair like):** produced by the coagulation of internal humor. It clots in the kidney.
7. Sediment having the appearance of yeast soaked in water is evidence of gastric and intestinal weakness and of deprived digestion.
8. **Rasoob Ramali (sandy):** This is always sign of calculus. If red coloured, it shows it comes from kidneys; if white, it shows the origin is in the bladder.
9. **Rasoob Ramadi (ashy sediments):** This is the sign that serous humour or pus has altered in colour through long stagnation and breaking up of its particles.
10. **Rasoob Alqi (hirudiniform like):** resembling colour of leeches. If well mingled with the urine, this denotes hepatic insufficiency. If discrete, it shows that the lesion is in the bladder or in the urethra.

Quantity of the sediments:

It is more abundant in females than males and in children than adults. It is less abundant in active person than inactive.

Quality of the sediments (colour, odour, appearance):

Black colour: Bad sign

Red colour: It shows dominance of sanguineous humour. It also occurs during fasting and imperfect digestion. If it persists for long time it denotes inflammation of the liver.

Yellow colour: means dominance of heat in the body.

Green colour: same significant as black sediments.

White colour: May be natural or abnormal sediment as the purulent, mucoid which denote faulty or deficient maturation.

Appearance: Roughness and irregularity indicates weak digestion and excess flatulence.

Position of the sediments, rate of deposits and its nature of amalgamation are also important signs for diagnosis of disease and also helpful to find out sign for disease prognosis. The discussion about urinary sediment is very long and this was just a small sample of what Avicenna had described in detail.

Quantity of urine:

Low urine output after normal fluid intake indicates failure of the forces. If the volume of the urine is much less than the amount of drinking, it indicates that either there is high fever or diarrhoea and vomiting. Avicenna continued to say that in renal failure, if decreased urine volume is accompanied by headache, it may be due to increased blood pressure. Avicenna explained oliguria in his book. He mentioned that oliguria can be due to drinking inadequate liquids, the effect of diarrhea on the body, disability of the kidneys, impaired absorption of fluids and disability of the liver in separation of the fluid. ^[16] Polyuria in acute illness occurring without any decrement/decline of symptoms; and associated with copious sweats, shows hectic fever are signs of the irritating process leading to phthisis (pulmonary tuberculosis) or convulsions. ^[12]

RESULT

This study reveals that Urinalysis by evaluating different features, including color, density, transparency, sediments, volume, odor, taste and froth, is an important tool for the diagnosis of different body state.

DISCUSSION

Urinalysis was an important diagnostic tool for diagnosis of illness and management of patients at the time of Greek predecessors. They believed that Urine most directly indicates the state of the liver and condition of the genitourinary organs and their passages and vessels. Less directly the urine yields information about the condition of the other organs. Urinalysis was done by examination and observation of urine. Different features, including color, density, transparency, sediments, volume, odor, taste and froth were evaluated. Avicenna was one of few pioneers who described Urinalysis in scientific way very similar to what is customary in the 21st century. This technique used by Greek predecessors became 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 in the laboratory procedure used in the medicine is the inspection of urine (Urinalysis) for diagnostic purpose. It is serving to the humanity since thousand of the years on the basis of experience and experimental observation. It is very good factual data, rich in scientific ideas which could be profitably studied by proper investigation and suitable correlation with the parameters of modern medical science. The Urinalysis is very important diagnostic tool in various physiological and pathological conditions. For example Urinalysis is very helpful in evaluation of human temperament. So this is well established fact that the Urinalysis is considered as a level of choice for diagnosis in body state from ancient to modern era.

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