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***Bawl* (Urine) and its credibility in unani system of medicine**

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Abstract

Human body is the centre of concern for a physician. To know the body condition of a person there are various tools used by them. Among them *Bawl* (urine) is one along with other tools that is *Nabd* and *Barāz*. Unani scholars used these tools since ancient time and they are still in use by the physicians of present era. It shows that these tools are irreplaceable. In this paper new advancement and techniques of urine are being taken into consideration. All seven indicators of urine explained by Unani scholars are still same but become superfine with advancement of microscopes and lab facilities that makes physician to diagnose human body state in a well elaborated method.

Keywords: uroscopy, *Bawl*, unani, urine examination

Introduction

Ancient *Sumer*, one of the earliest civilizations, recognized that urine characteristics were altered with different diseases. *Hippocrates* (460–355 BC) is credited with being the original uroscopist. He hypothesized that urine was a filtrate of the humors, which came from the blood and was filtered through the kidneys. *Galen* thought that the liquid ingested equaled the urine expelled in a healthy person. Today, a decrease in urine output is known to be a symptom of dehydration or chronic renal failure. Uroscopy is the mirror of medicine for thousands of years. It is a liquid window through which physicians could view the body's inner workings. Uroscopy is a way to distinguish and measure any imbalance by; Rational, Painless, and Non-invasive method. ^[1] *Tibb* is divided into two parts i.e., '*Ilmi* (Theoretical) & '*Amali* (Practical), both are '*Ilm* (knowledge): first one is *Tibb-e-Ilmi* that comprises of *Umūr Ṭabī'iyya*, *Hālāt Badan-e-Insān* (State of Human body), *Asbāb* (Causes), and '*Alāmāt* (Sign and Symptoms). Second one is *Tibb-e-Amali* that means applied aspect/practical of *Tibb-e-Ilmi*. ^[2] *Hālāt Badan-e-Insān* (Human Body States): *Ibne Sina* states that there are two types viz; *Hālāt-i-Ṣiḥḥat* (healthy state) and *Hālāt-i-Maraḍ* (diseased state). *Jalinoos* considers one more state of human body i.e., *Lā Ṣiḥḥat Lā Maraḍ/Hālāt-e-Thālitha* (neither complete health nor disease). ^[3] *Tashkhiṣ* By '*Alāmāt* (Diagnosis by Symptoms): Symptoms are the best tool to diagnose the states of the human body, either it is healthy, diseased or in between these two. '*Alāmāt* (Symptoms) are of two types: *Zahira* (External) and *Baṭīna* (Internal). ^[3, 4]

***Adilla-e-Tashkhiṣ* (Modes/Tools of Diagnosis):** In classical literatures there are main three modes of diagnosis: *Nabd* (pulse), *Bawl* (urine), and *Barāz* (stool). *Bawl* (Urine) is a metabolic body waste (*Fuḍlāt-e-Badan*). ^[3, 4, 5, 6] It represents '*Alāmāt-e-Baṭīna*, indicates the condition of liver, kidney, urinary bladder, ureters specifically but it also indicates whole body conditions. ^[5] It indicates *Kayfiyāt* (qualities) of the internal environment of the body, & quality of body waste (well metabolised or not), quality of body fluids, and *Kamiyat* (quantity) of body fluids. ^[7] Many disorders may be detected in their early stages by identifying substances that are not normally present in the urine by measuring abnormal levels of certain substances, for example; glucose, protein, bilirubin, RBCs, WBCs, crystals, and bacteria. They may be present because of elevated level of the substance in the blood and the body responds by trying to eliminate the excess in the urine. ^[8, 9]

***Tameez-e-Bawl* (Urine Formation):** Urine formation starts from the liver. In the process of digestion, in liver chyme is converted into blood with the help of water. After the completion of *Nudj* (Metabolism) of chyme three types of *fuzlat* (metabolic wastes) are formed viz. *Raghwah* (foam), *Talchat* (argols), *Bawl* (urine). ^[10, 11] Kidney harvests nutrition from the

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blood coming down from liver and absorb water leaving behind urine for excretion (*Maseehi*).

Bawl (Urine) and Ajnās-e-‘Ashara: *Fuzlat-e-Badan* (Excreta of the Body) are one of the tools in the diagnosis of temperament both in healthy and diseased state. Urine is an important excreta along with other body excretion e.g. faeces, sweat, nasal discharge etc. The colour, consistency, viscosity, odour, as well as state of urine are taken into the consideration to look for *Mizāj* of an individual. [3, 5, 6] Here, below the table is being given to show the different urine properties in different temperaments: [3, 5, 6, 11].

Table 1: Qualities of *Bawl* (Urine) according to different *Mizāj* (Temperaments)

Temperament	Urine characteristics
<i>Şafrāwi</i> (Bilious)	Tends to be scanty, dark, and thin. Can be hot or burning.
<i>Damwi</i> (Sanguine)	Tends to be more in quantity, bright yellow and thick.
<i>Balghami</i> (Phlegmatic)	Tends to be clear or pale and thick, scanty in volume, with excess fluid accumulation in the body.
<i>Sawdāwi</i> (Melancholic)	Tends to be clear and thin.

Significance of collection of Urine: Urine is collected for its analysis with respect to the need that is as follows: For qualitative examination early morning sample is taken, routine examination is done by random sample. In quantitative analysis 24 hours Sample of urine is required that is done for estimation of proteins, vanillin mandelic acid, 5-hydroxyindole acetic acid, or metanephrines to diagnose any neuroendocrine disorders like pheochromocytome, for detection of hormones in urine, for detection of micro albuminuria. In urinary tract infection (UTI), midstream sample is considered best. In the patients of diabetes mellitus post prandial sample is suggested. In infants and bedridden patients catheterisation is done to collect urine. In some cases supra-pubic needle aspiration is also done. [12]

Sharai’t-e-mu‘āyana bawl (Principles of Urine Examination): There are some principles given by Unani scholars in their classical manuscript like *Maseehi*, *Majoosi*, *Ibne Sina* and their followers that are as follows: Morning sample of urine should be collected. The specimen should not be retained for too long in the bladder. The person must not have taken either food or drink before passing it. The previous food taken should be free from coloring agents. Substances having coloring property, such as henna, should not be applied on the face and skin because sometimes they color the urine. Sample should be examined within 1-2 hours of voiding. The patient should not have given an agent which expels some humor (a cholagogue or phlegmagogue) by the urine. The patient should not have done any severe exercise or strenuous work, or suffer any unusual mental state, or under fasting, wakefulness, anger, vomiting & diarrhea etc. because in each case the color of urine may alter. One should allow it to settle before analyzing it. The vessel used for the specimen must be clean and washed, and the previous sample must have been rinsed out of it. [3, 7, 11, 13]

Material and Methods

Dalaail-e-Bawl (Indicators of Urine Analysis) As Per Classical Literature: The following are the points to observe in a sample of urine according to *Ibne Sina* and other Unani

scholars: *Alwān al-Bawl* (Color of The Urine), *Qiwām* (Consistency), *Miqdār* (Quantity), *Rasūb* (sediment), *Kaf/Jhāg* (Foam), *Bū* (Odour) and *Safayi Wa Kadurat* (clarity And Turbidity). [3, 11, 14] These are the things which come in *Idrāk* (Perception) by the five senses as per the technologies available at their respective time.

Dalaail-e-Bawl (Indicators of urine analysis) with the timely advancement: In past; it was only limited to macroscopic. It was not in such form in the ancient time as it is today. At present; it has become possible due to advancement in the lab sciences with the help of microscopes & chemistry. In future; it may reach more steps ahead. In this paper the *Dalaail-e-Bawl* are being analyzed with the today’s urine examination. Indicators of urine in Unani literature are used till date but they have been categorized as first one is *Macroscopic/Physical/Visual examination*, second one is *Chemical examination*, and last one is *Microscopic examination*. Therefore in this paper these seven indicators of urine are divided under these three headings. [8, 9]

Macroscopic examination: The first part of urinalysis is direct observation through senses of perception: *Alwān al-Bawl* (Color of the Urine), *Miqdār* (Quantity) in volume, *Bū* (Odour), *Zubdat al Bawl/Kaf/Jhaag* (Froth of Urine)

Alwān al-bawl (color of urine): The color of urine is the result of dissolved particles which perfuse the whole substance of it. Urochrome pigment (urobilin) and the dilution or concentration of the urine is also responsible for the color of the urine. [8] In Unani text the color of urine is enclosed in 5 degrees (excluding complex colors), which are as follows: The degree of; Yellowness (*Bawl Asfar*), Redness (*Bawl Ahmar*), Whiteness (*Bawl Abyaz*), Darkness or Blackness (*Bawl Aswad*) and Green color (*Bawl Akhzar*). The description about these colour and their characteristics are as follows. [3, 4, 5, 6, 7, 10, 11, 15]

The Degree of Yellowness: Bawl-e-Aşfar Tibnī (Straw-yellow color urine): If it is thicker, and a *Rasūb* (sediment) is present, it shows that the *Hađm* (digestion) is not altogether bad. If sandy, scaly, with black/dark/green, or fetid sediment, this shows entire *Sue-e-Hađm* (lack of digestive function). *Bawl-e-Aşfar Utrujī* (Lemon-yellow or Citron-yellow color urine): This color usually found in normal healthy urine. It indicates normal degree of *Hararat* (hotness). This is the color of *Bawl-e-Tabayi* (Normal Urine). *Bawl-e-Aşfar Ashqar* (Clear reddish-yellow color urine): It indicates higher than normal degree of *Hararat* (hotness) or *Sue Mizāj Har*. It is produced as the result of degree of amount of exercise, pain, fasting and insufficient fluids. *Bawl-e-Aşfar Narangi* (Orange-yellow color urine): *Bawl-e-Aşfar Nārī/Aşfar Mushabba* (Flame-yellow or Perfect-yellow color urine): It indicates predominance of the *Khilt-e-Şafrā* (bilious humor). *Bawl-e-Aşfar Za’frānī/Ahmar Nasie* (Saffron-yellow or Bright-red color urine): It indicates highest degree of *Hararat* (hotness) or *Sue Mizāj Har* among all types of yellow urine. The urine tends to saffron-yellow and flame-yellow in acute diseases described as “burning”. *Bawl-e-Aşfar Za’frānī/Ahmar Nasie* (Saffron-yellow or Bright-red color urine): If the urine at all inclined to be clear, it shows a certain degree of “digestion,” has actually begun, but its products have not yet appeared in the substance of the urine. It also indicates the predominance of the *Khilt-e-Safra* (bilious

humor).

Note: The degree of *Hararat* increases as urine turns from *Tibnī* to *Aşfar Za'frānī*, and the causes are the same but with increase in their intensity. ^[3]

The Degree of Redness: *Bawl Aḥmar Aḥṣab* (Purple Red/Pink/Brown-red color urine): It indicates dominance of *Khilt-e-Dam* (sanguineous humor). It is seen in *Fālij Hissi*, intake of certain drugs, or food colors. *Bawl Aḥmar Wardī* (Rose-red or roseate or rosy color urine): It indicates dominance of *Khilt-e-Dam* sanguineous humor. It is seen in diseases of liver especially cirrhosis of liver *Bawl Aḥmar Qānī* (Very Dark Red/Vermillion color urine): It indicates dominance of *Khilt-e-Dam* (sanguine humor). In *Amrāz-e-Hadda* (Acute diseases) of hemorrhagic character, it indicates an excessive profusion. If it occurs gradually, associated with a bad odour, it indicates that there is hemorrhage proceeding from congested parts (the prognosis is still worse if the urine becomes thinner and more offensive in odor). *Bawl Aḥmar Qānī* (Very dark red/Vermillion color urine): If it occurs in *Hād Humma Murakkab* (acute composite fevers), it is a good sign because it shows that *Buḥrān* (crisis) is about to take place, and recovery will follow. The only exception is if the urine becomes suddenly transparent before the crisis is due. Such phenomenon would be a forerunner of a relapse. But thin urine appearing after the crisis may be equally unfavorable unless the change has been gradual and progressive. *Bawl Aḥmar Aqṭam* (Smoky-red or Dull-red or Blackish-red color urine): It indicates dominance of *Khilt-e-Dam* (Sanguineous humor). If it occurs in jaundice, it is a good sign because it is an evidence of expulsion of diseasing fluid. It is seen in Haematuria, *Fālij* (paralysis), *Sū al Qinya*, & *Qūlunj* (Colitis).

The Degree of Whiteness: *Bawl-e-Abyaḍ Majāzī* (Transparent White or Colorless/Thin Urine): It indicates the *Sue Mizāj Barid* and *Sue Haḍm* (Defective digestion). *Bawl-e-Abyaz* (water like clear) is found in diabetes, incontinence of urine, excessive thirst and then drinking more fluid, which passes out as such. It also indicates *sue Mizāj of Kabid* or *Zauf-e-Kabid* (weakness of liver.) *Bawl-e-Abyaḍ Haqīqī* (*Zulālī/Baiḍī*) (Transparent white or colorless /Thick Urine): It indicates presence of *Balgham* (phlegm) or in other words indicates Albuminuria. *Bawl-e-Abyaḍ Mukhātī* (Mucilaginous Urine): It is an indication of *Adm Nuḍj* (incomplete combustion). It indicates excess of *Balgham* (phlegm). If the urine is thick in consistency also then it indicates *Balgham-e-Kham* (crude phlegm). *Bawl-e-Abyaḍ Dasmī* (Oily or Fat-like Urine): Fat mixed urine-indicates *Zuban-e-Shahm* (liquefaction of fat). *Bawl-e-Abyaḍ Ihālī* (Greasy or Soapy or Waxy urine): It indicates *Balgham* (phlegm) and actual or latent dissolution of fat. It indicates: diabetes; active or latent, bad prognosis in acute fever, possible attack of tuberculosis in future. *Bawl-e-Abyaḍ Fuqā'ī* (Musty white or Champagne-like urine): In the presence of pus: It is seen in septic ulceration of urinary passages, and Calculus in urinary bladder. *Without pus*: It is seen in dominance and excess of crude, non-mature matter, and Sometimes it is owing to stone in the bladder.

Bawl-e-Abyaḍ Manwī (Semen-like Urine): It passes during *Buḥrān* (crisis) of Phlegmatic swellings, looseness of viscera and crisis of the diseases arising from vitrious phlegm. It may be an indication of *Sakta* (apoplexy) and paralysis. If urine

remains white throughout the fever, it is likely to change over the *Humma Rib'a* (quartan type).

Bawl-e-Abyaḍ Raşāşī (Lead-White Urine): This type without *Rasūb* (sediment) is very bad.

Bawl-e-Abyaḍ Labnī (Milky Urine): During *Amraz-e-Hadda* (acute diseases) it is fatal sign. *Bawl-e-Ghusālī* (Raw Meat-Washing color urine): If it occurs with the *Zauf-e-Haḍm* (weakness of digestion) and *Zauf-e-Quwa* (dispersion of vitality), it indicates the hepatic as well as renal insufficiency. If various faculties are sufficiently strong, this type of urine results from the excess of blood in body.

The Degree of Green Color: *Bawl e Akhzar Fustuqī* (Pistachios green color urine): It indicates the *Burudat*. In children green colour urine is a sign of *Tashannuj* (spasm). It is seen in *Yarqan* (jaundice). *Bawl e Akhzar Āsmānjūnī* (Rainbow-green or sky-green color urine): It indicates an extreme coldness. It may also show that poison was present in the fluid taken as drink. If there is sediment present in urine then there is a hope of recovery; if no sediment, death is likely to take place. *Bawl-e-Akhzar Nīljī* (Emerald-Green color urine): It indicates: *Sue Mizāj Barid* and Poisoning. *Bawl-e-Akhzar Kurrāthī* (Leek-Green color urine): It indicates: Hot conditions in the body and extreme catabolism or Poisoning. It is not as unhealthy or dangerous as Verdigris green color urine. *Bawl-e-Akhzar Zanjārī/Zangārī* (Verdigris-Green color urine): It indicates *Shadeed Ehtraq* (extreme catabolism). It is more unhealthy or dangerous than Leek green color urine. It forewarns of death (destruction of innate heat). If it should be met with after physical labour it indicates *tashannuj* (spasm). *Bawl-e-Zaitī* (Olive-oil color urine or oleaginous urine): It shows the fat of the body is being destroyed. If such urine be also fetid and scanty in amount, it is a very ominous sign. If it replaces black urine, it is a good sign.

The Degree of Darkness or Blackness: Bawl-e-Aswad (Dark Black Urine): It indicates: *Shadeed Ehtraq* (Extreme oxidation), *Shadeed Burudat* (Extreme cold), *Buḥrān* (Crisis), extinction of the innate heat i.e., death, evacuation of *sauda*, sometimes black colour urine is also found after menses which is not an indication of a disease. ^[14] It is seen in diseases of spleen, uterus, *Humma rib'*, retention of bleeding of piles, haematuria, delirium, fatigue, and spasm. Due to coldness it is thick and due to hotness it is thin comparatively.

Approaching Blackness through Dark Saffron-Yellow Color: It indicates denseness and oxidation of the bilious humor, atrabilious humor derived from bilious humor or Jaundice.

Deep-Brown Black or Dark-red Color Urine: If the darkness of urine is after redness in it, then it represents the combustion (*ehtraq*) of the *Khilte Dam* (sanguinous fluid). It is the worst type of urine in acute fever. If this type of urine is also thick in consistency then there are chances of death.

Greenish-Black Color Urine: It shows the Dominance of pure *Khilt-e-Sauda* (Melanchole). Black urine which comes after whitish or greenish urine is an indication of *Burudat* (coldness) and death of *Hararat Ghariziya*.

The Compound Colors: *Bawl-e-Arghawani/Arjawani* (Purple color urine): This is a very bad and fatal sign. It indicates

oxidation of both bilious and melancholic humour. *Bawl-e-Jumri* (Ruddy color urine): This occurs in *Humma Murakkaba* (composite fevers) and in fevers arising from gross profusion. If urine of this type is clarified, and the darkness settles down from the surface, it indicates pleurisy.

Miqdār-e-bawl (urinary volume): There are some types based on the volume of urine that are as follows; Normal: 600-2000 ml with night urine not in excess of 400 ml. Polyuria- more than 2000 ml/24 hours. Oliguria- urine excretion is more than 500 ml/24 hours. Anuria- Complete cessation of urine or lesser than 200 ml/24 hours. Nocturia- Excretion of urine by an adult is more than 500 ml/24 hours with a specific gravity of less than 1.018 at night. *Asbāb/Causes of Polyuria:* Diabetes mellitus, Diabetes insipidus, Polycystic kidney, Chronic renal Failure, Diuretics, Intravenous saline/glucose. [8, 9] *Asbāb/Causes of Oliguria:* Dehydration- vomiting, diarrhoea, excessive sweating, acute glomerulonephritis, congestive cardiac failure. *Asbāb/Causes of Anuria:* Acute tubular necrosis, complete urinary tract obstruction. [10]

Bū/Odour: Various odour of urine are as follows: Normal odour in aromatic due to the volatile fatty acids. Ammonical odour is found in bacterial action like E. coli, fruity odour in ketonuria or starvation, musty odour in phenylketonuria, fishy odour in UTI with proteus, and rancid odour in tyrosinemia. [9]

Zubda al Bawl/Froth of Urine: Indicates predominance of *Rīh* (gas) in the body. The following things are considered in this indicator: Color of froth; *Siyah* (Black) in *Yarqan Aswad* (Black Jaundice) and *Ashqar* (orange) in *Yarqan Asfar* (Yellow Jaundice). Size of froth; Larger the size means more viscosity in *madda* (sample). Quantity of froth; More quantity shows viscosity of *lazujat* in *madda* as well as *Rīh* (gas) & its vice-versa [13, 14].

Chemical examination: Tests chemically for some substances that provide valuable information about health and disease and determine the concentration of the urine. Reaction or urinary pH, specific gravity, osmolality, proteins, sugars, ketone bodies, bilirubin, bile salts, urobilinogen, and blood comes under chemical examination. [8, 9]

Note: *Safayi Wa Kadurat* (clearness And Turbidity)/*Rasūb* (sediment) comes under the Specific gravity & Osmolality.

Rasūb Bawl/Sediments of Urine: Unani scholars describe *Rasūb* as the things whose consistency is more than water & clearly visible whether it is on the surface or in middle or at the bottom in urine sample. *Rasūb Ṭabī'ī Maḥmūd:* Sediments which are produced naturally and are present at the base of urine. These are *Mutasil*, *Mutashabe*, & *Mustawi* (homogenous) in nature and odourless. It is white in colour, & indicates *Tabayi Haḍm* (normal digestion). *Rasūb Gha'ir Ṭabī'ī:* These are as follows: *Rasūb Khurāṭī:* Sediments which are similar to sawdust. *Rasūb Khurāṭī Nukhālī:* Wheat husk in colour. *Rasūb Khurāṭī Karsanī* (Earthy): Yellowish Grey. *Rasūb Khurāṭī Dashīshī* (Gritty): Red Dark Yellow. *Rasūb Khurāṭī Sawīqī* (Flaky): Flour like sediments. *Rasūb Khurāṭī Ṣafā'ihī:* Flat Peel Like. *Rasūb Dasmī* (Fatty): Indicates increased catabolism of fat. *Rasūb Laḥmī* (Fleshy): Meat like sediments. It indicates renal failure. *Rasūb Middī* (*Pus*): Indicates the presence of pus in urinary tract.

Rasūb Mukhāṭī (Mucoid sediment): Indicates the presence of viscous humour in body. *Rasūb Khamīrī* (Fermented): Indicates the presence of viscous humour in the body. *Rasūb Ramlī* (Sandy): Indicates the presence of calculus. *Rasūb Ramādī* (Ash like): Indicates pus & raw phlegm. [3, 11] *Qiwām/Consistency:* Urine could be either thick or thin in consistency.

Asbāb Bawl Raqeeq wa Ghaleez (Causes of urine consistency): *Bawl Raqeeq* indicates: *Adm-e-Nuḍj*, *Zauf-e-Mujari Bawl*, *Sudda-e-Urooq*, *Excess of water in body*, *Shadeed Burudat*. In children normally there is *Bawl Ghaleez*, but if found to be *Raqeeq* then it is a bad sign. *Bawl Ghaleez* indicates: *Nuḍj*, *Tehleel-e-Awrām*, *Expulsion of Khilṭ* in *Ḥummiyat-e-Khilṭiya* [3, 5, 6, 10, 11, 13, 16].

Qiwām (Consistency)/Osmolality: It is more accurate than specific gravity, as it measures the total number of dissolved particles, regardless of their size. Normal adult with normal fluid intake will produce urine of 500-850 mOsm/kg water. It is useful in diagnosing disorders of urinary concentration such as diabetes insipidus & in assessing hydration status. The normal kidney is able to produce urine osmolality in the range of 800-1400 mOsm/kg water in dehydration and minimal osmolality of 40-80 mOsm/kg water during diuresis. [17]

Urinary pH/Reaction: It reflects ability of kidney to maintain normal hydrogen ion concentration in plasma and extra cellular fluid. Normally it is 4.6-8.

Bawl-e-Khari (Acidic urine): It is found in; Ketosis-diabetes, Starvation, fever, Systemic acidosis, UTI by E. Coli, Acidification therapy, High protein diet.

Bawl-e-Asasi (Alkaline urine): It is found in; Strict vegetarian, Systemic alkalosis, UTI by pseudomonas or proteus, Alkalization therapy, Chronic Renal Failure. It can be tested by; Litmus paper, pH paper, or Reagent strip method. [8, 9]

Specific Gravity: It depends on the concentration of various solutes in urine of varying size, from small ions to larger proteins. It is based on the principle of buoyancy. Normal range is 1.003-1.035. [1] It is Measured by: Urinometer, Refractometer, Reagent strip method/Urine Dipstick, Falling drop method. *Asbāb/Causes of Hypersthenuria* (High specific gravity): All causes of oligouria, DM, Dehydration, Nephrotic syndrome. *Asbāb/Causes of Hyposthenuria* (Low specific gravity): All causes of polyuria except glycosuria, DI, Polynephritis, Glomerulonephritis. *Isosthenuria* (Fixed specific gravity): Chronic renal disease, when kidney has lost the ability to concentrate or dilute. [18]

Tests for Proteins: Heat, Acetic Acid Test, Nitric acid test, Sulphosalicylic acid test, Test with Esbach's reagent, Biuret method, and Protein reagent urine are done to check the presence of protein. *Asbāb/Causes of Proteinuria* are Glomerular proteinuria; Due to increased permeability of glomerular capillary wall, e.g. Nephrotic syndrome. Tubular proteinuria; in acute and chronic pyelonephritis, heavy metal poisoning, tuberculosis of kidney etc. Overflow proteinuria; Bence Jones Proteins (Plasma Cell Dyscrasia), Intravascular Haemolysis, Skeletal Muscle Trauma. Haemodynamic proteinuria; Seen in high fever, hypertension (HTN), heavy

exercise, chronic cardiac failure etc. Post renal proteinuria; Inflammatory or neoplastic conditions in renal pelvis, ureter, bladder, prostate or urethra. [8, 9]

Microalbuminuria: It is the presence of albumin in urine above normal level but below detectable range of conventional urine dipstick method. It is defined as urinary excretion of 30-300 mg/24 hrs of albumin in urine.

Significance: An indicator of subclinical cardiovascular disease, and kidney disease, in diabetes mellitus (DM); earliest sign of renal damage in DM, in HTN, increasing microalbuminuria during the first 48 hours after admission in ICU predicts elevated risk of acute respiratory failure, multiple organ failure, and overall mortality. Detection of microalbuminuria is done by; Measurement of albumin creatinine ratio in random urine sample, measurement of albumin in early morning sample, and measurement of urine in 24 hr sample. [8, 9]

Test for Sugar: Benedict's test detects all reducing substance like glucose, fructose, and other reducing substances. These tests are; glucose dipstick test, reagent strip method, Fehling's method, osazone test. [9] *Asbāb/Causes of Glycosuria* are as follows; Glycosuria with hyperglycaemia found in diabetes, acromegaly, Cushing's disease, hyperthyroidism, and drugs like corticosteroids. Glycosuria without hyperglycaemia is found in renal tubular dysfunction. [8]

Test for Ketone Bodies: According to products of fat metabolism it has following types: acetone, acetoacetic acid and beta hydroxy butyric acid. Test to diagnose it are Rothera's test, acetest tablet test, ferric chloride test (Gerhardt's test), Hart's test for beta hydroxy butyric acid. *Asbāb/Causes* are diabetes, high fever, starvation, severe vomiting/diarrhoea, and glycogen storage disease. [8, 9]

Test for Bilirubin: Fouchet's test, Foam test, Gmelin's test (nitric acid), Lugol's iodine test, reagent strip with diazo reagent is done. *Asbāb/Causes* are liver diseases- injury, hepatitis, obstruction to biliary tract. [8, 9]

Test for Urobilinogen: Ehrlich test is done to check the presence of it. *Asbāb/Causes* are haemolytic jaundice, early hepatitis, and hepato-cellular jaundice. [8, 9]

Bawl al Dam/Blood in urine: Benzidine test is useful to check the presence of blood in given sample of urine. *Asbāb/Causes* are; Pre Renal- bleeding diathesis, haemoglobinopathies, malignant hypertension, Renal- trauma,

calculi, acute and chronic glomerulonephritis, renal tuberculosis, renal tumours, and Post Renal- severe UTI, calculi, trauma, tumours of urinary tract.

Microscopic examination: A well-mixed sample of urine (10-15 ml) is centrifuged in machine for 5-10 min at 1500 rpm. The top liquid part is discarded. A drop of urine left at the bottom of the test tube (sediment) is placed on glass slide and covered with cover slip. It is examined under high power.

Contents of normal urine M/S: Few epithelial cells, occasional RBC's, WBCs, few casts and crystals. Abnormal findings; as per low power field (LPF) (200x) - more than 3 hyaline casts or more than 1 granular cast, more than 10 squamous cells (indicative of contaminated specimen), and any other cast (RBSs, WBCs). As per high power field (HPF) (400x)- more than 3 erythrocytes, more than 5 leukocytes, more than 2 renal tubular cells and more than 10 bacteria. *Asbāb/ Causes of RBCs;* Indicates the presence of glomerular damage, tumours of urinary tract, kidney trauma, urinary tract stones, renal infarct, acute tubular necrosis, UTI, Nephrotoxins, physical stress. *Asbāb/Causes of WBCs (pyuria)* indicates: glomerular nephritis, vaginal and cervical infections. [8, 9]

Bawl Qushārī/Casts: Urinary casts are cylindrical aggregations of particles that form in the distal nephron, dislodge, and pass into urine. In urinalysis they indicate kidney disease. They form like precipitation of Tamm-Horsfall mucoprotein which is secreted by renal tubule cells. Casts may be acellular or cellular. Acellular casts may be hyaline casts, granular casts, waxy casts, fatty casts, pigment casts, and crystal casts. Cellular casts are may be of red cell casts, white cells casts, epithelial cell casts. *Asbāb/ Causes of;* Hyaline cast: may be found in healthy urine. RBCs Casts found in glomerulonephritis, with leakage of RBCs from glomeruli, severe tubular damage.

Crystals in urine: there are some crystals also found according to different medium of urine like in acidic urine uric acid, calcium oxalate, cystine, and leucine crystals may be found. In alkaline urine ammonium magnesium phosphate (triple phosphate crystals) and calcium carbonate crystals may be found. [8, 9]

Urine Dipstick: Hellen Murray Free and her husband, Alfred Free, pioneered dry reagent urinalysis, resulting in the 1956 development of clinistix or clinistrip. This breakthrough led to additional dip and read tests for proteins and other substance. [19]

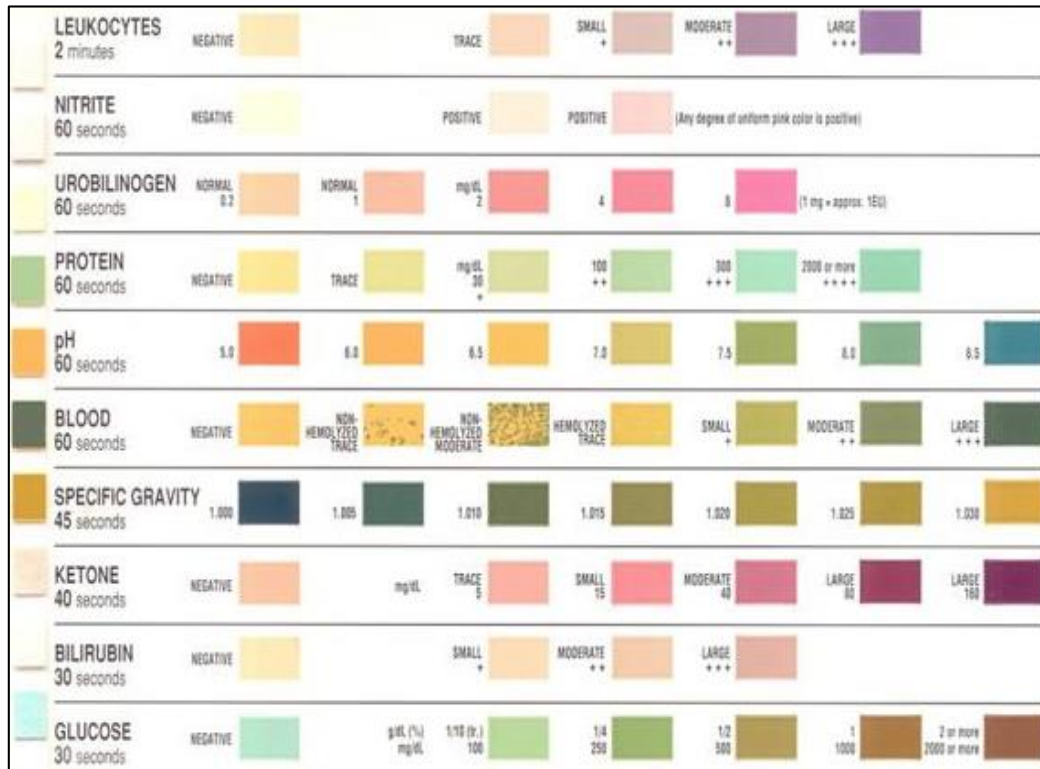


Fig 1: Urine Dipstick Chart

Urine Analyser: A urine analyser is a device used in the clinical setting to perform automatic urine testing. The units can detect and quantify a number of analytes including bilirubin, protein, glucose and red blood cells. Many models contain urine strip readers, a type of reflectance photometer that can process several hundred strips per hour. [20]



Fig 2: Urine Analyser

Note: Unani terminologies are written in the above text according to the book “Standardisation of Unani terminologies” published by Central Council of Research in Unani Medicine, New Delhi. [21]

Discussion: As it has been discussed above that uroscopy is the diagnostic tool since ancient civilizations. Renowned Unani physicians and scholars like Hippocrates and Galen had been given a very beneficial impact on this tool of diagnosis. In every civilization, the physician of respective era like Majoosi, Maseehi, Ibne Sina, Ibne Hubal Baghdadi, Ibne Rushd and their followers like Qarshi, Sadeedi, Ibne Nafees and so on also maintained the same. Their manuscripts and knowledge upon the topic shows that uroscopy has as same

value of practice in their era as it is in today’s practice. According to the timely advancement new technologies developed in basic sciences to reach in more depth to look for the things for better knowledge. Therefore, microscopes and lab revolution is also the basic cause behind the superfine form of urine analysis as it is today. In ancient time the indicators of urine was limited to sensory perception. But now the helping tools of these senses have been made to feel the matter upto its nano level. So, the *Rasūb* that was macroscopic, now it can be seen as casts and crystals of urine with their microscopic picture. Microscope is nothing but the help of visual sense. *Qiwām* can be categorized by checking its osmolality. *Miqdār* (volume) of urine can be digitalized with the help of unit measurement in millilitre. *Safayi Wa Kadurat* (clearness And Turbidity comes under the specific gravity & osmolality. And the particles in urine can be examined now under chemical examination as well as under the microscope and diagnosis easily can be made by knowing specific chemical content and its microscopic appearance present in the given sample of urine. Although *Bū* (Odour) is physical but the actual cause behind that particular odour is presence of causative matter, therefore and to look that, chemical and microscopic examination is done.

Conclusion: Uroscopy is the mirror of medicine for thousands of years. It is a liquid window through which physicians could view the body's inner workings. Urine investigation is an important tool for the diagnosis of human body state. Early disease diagnosis or deviation from the healthy state is possible with its help. In present era urine is investigated in its physical, microscopic and chemical aspects. *Alwān al-Bawl* (Color of the urine), *Miqdār* (Quantity), *Bū* (Odour), and *Zubdat al Bawl/Kaf/Jhaag* (Froth of urine) comes under physical examination. *Qiwām* (Consistency), *Rasūb* (sediment), and *Safayi Wa Kadurat* (clarity And Turbidity) comes under the chemical and microscopic examination. *Rasūb* (sediment) specially comes under the

microscopic examination as it tells about the presence of different types of cellular and acellular components present in urine. Urine investigation is done for the purpose of screening, help in diagnosis or monitor several diseases and condition like DM, kidney disorders, UTI and so on.

Conflict of Interest: Nil.

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