

A Study of Methods of Sample Collection and Identification in Uroscopy

Md Khursid Alam Ansari^{1,*}, Shabistan Fatma Taiyabi², Md. Shafat Karim³

¹Ayush Doctor, Primary Health Centre, Patedhi Belsar, Vaishali, Bihar.

²PG Scholar, Department of Mahiyatul Amraz (Pathology), Government Tibbi College and Hospital, Patna, India

³Assistant Professor, Department of Ilmul Saidla, Government Tibbi College and Hospital, Patna, India

Abstract

Uroscopy is the first documented laboratory test in medicine and is a fundamental diagnostic tool in the Unani system of medicine. Proper sample collection, handling, and identification are important to insure valid results in uroscopy. There are certain do's and don'ts about the sampling mentioned in the text of the Unani medicine that should be followed. Generally, a urine sample is collected by the patient himself or herself, hence they must be educated to avoid contamination to ensure the purity of the sample. Despite this, there is a chance for error or malpractice hence collected samples should be identified for sufficiency and originality. There is a certain factor that can cause an erroneous result that must be avoided. Unani scholars have mentioned that sometimes patients brought other similar fluids or animal urine to test the competence of the physician or to mislead the diagnosis. To deal with such a situation differentiation of urine with other liquors should be made. The method of sample collection and identification for uroscopy are systematically summarized in this paper.

Introduction

Uroscopy is a scientific examination of urine of medical importance and linked with the humoral doctrine. Urine is the most freely accessible biological fluid.^{1,2} Generally, sample (urine) collection is non-invasive and almost totally under the control of patients because of their privacy. Hence, unintentional or intentional malpractice in sample collection and transportation is inevitable. So, pre-analytical identification of the sample is important. Medical practice was always a prestigious profession. During the Middle Ages, the urine flask (Matula) was the badge of honor for physicians like the white apron and stethoscope do today. As a professional trademark physicians were carrying a matula on their horsebacks.¹ Patients also expect their physician to analyze urine otherwise the doctor would be thought to be ordinary or less skilled. Ibn Sina (980-1037AD) used to warn the physicians that sometimes patients brought other similar liquid or animal urine to test the competence of the physician or to mislead the diagnosis. To deal with such a situation differentiation of urine with other liquors should be made. Probably it was the earliest attempt to quality control.^{1,3,4}

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Corresponding author:

Md Khursid Alam Ansari, Ayush Doctor,
Primary Health Centre, Patedhi Belsar,
Vaishali, Bihar.

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Prerequisite

The proper history taking and physical examination of the patient is a prerequisite. Previous food must be free from any coloring agent like crocus, cassia fistula, potheerbs, salted fish, intoxicating wines, etc. or any coloring agent like henna must not be applied on the skin. Many drugs like phenazopyridine, chlorzoxazome, salicylazosulfapyridine, anisindone, sulphonamides, nitrofurantoin, phenolphthalein, amidopyrine, riboflavin, levodopa, iron salt, triamterene, etc are also responsible for urinary color change. If any drugs or diet which expel any humour is taken by the patient must be mentioned.^{5,6}

Factors affecting normal urine

Fasting, vomiting, diarrheas, sleeplessness, heavy labor, exercise, fear, anger, or any altered psychological state can change the color and composition of urine. According to Ibn Sina, characteristics of healthy urine are "A medium consistency; a delicate tint, tending to straw yellow; if there be any sediment it is white, light, homogenous, and has a rounded counter; the order should be moderate, neither offensive nor altogether absent".⁵ The normal feature of urine also varies in different ages, sex, and physiological condition that should be kept in mind during sample identification.

Infancy:

The urine of this age group is nearly colorless due to their ingested food being milk that is of moist temperament.⁵

Childhood:

The urine is thicker, coarser, and more turbid than the adult, with tiny bubbles at the surface.⁷

Adolescence:

The urine is gradually increasing in foment and homogeneity.

Adult:

The urine tends to be reddish-yellow (straw), but it is of moderate density and coarser than a child's because, with an increase in age, the effete matters are being evacuated to a greater extent in the urine.^{5,7}

Elderly:

The urine is whiter, still more tenuous, and thicker.

Women:

The urine is comparatively thicker, whiter, and less pellucid than males, because of their weakness of digestion, and abundance of effete matters. There is the feebleness of digestion; abundance of effete matters; width of emunctory channels; uterus-vaginal discharge, which draws similar material down the urinary passages also. When women's urine is shaken it doesn't show turbidity and usually, a circular foam appears on top whereas when men's urine is shaken it becomes turbid that ascends to the surface. If urine of men and women is mingled it forms a filamentous network at the top. A filamentous network also formed in post-coital men's urine.^{5,8}

Pregnant women's urine:

It shows a cloudy appearance on the surface of clear urine. The color of urine is like chick-pea water, or be yellow with a bluish or rainbow-like tint. Cotton-like tint appears in the mid of the vessels. Occasionally diving granules may be present. A distinct rainbow tint denotes early pregnancy whereas in late or full-term pregnancy if this tint dominates redness it denotes full-term pregnancy, especially if

urine becomes turbid on shaking. During Puerperium the urine is blackish dark.^{9,10}

Vessel for urine collection:

In the Arabic text of Unani medicine the vessels for urine collection in termed Quaroorah meaning flask. It is a bladder-shaped flask made up of transparent glass/ flint glass (Blur). Gilles de Corbeil (1165–1213) introduced a modified version of Quaroorah, termed Matula which was vertically divided into 4 levels.⁴

Sample collection:

From sample collection to declaration of final remark, every step is important in laboratory medicine. Handling, storage, and treatment of samples should be as per the purpose of uroscopy. Due to advances in physics and chemistry, various sophisticated tools are available that can be used to draw an easy and precise conclusion from uroscopy. There are specific guidelines for sample collection in uroscopy. Ismail Gorgani (1040-1136 AD) instructed that urine should be collected in its full amount over 24 hours in a clean, dry, sterile Quaroorah. The collected sample should be labeled properly. Label the sample container with the Patient's name, age, sex, time, and date of collection. Avoid exposure to direct sunlight, wind, and freezing cold of a collected urine sample to prevent color change.³ A morning urine sample is best for analysis and the patient must not take any food or drink before voiding urine. If the sample is collected other than morning empty stomach or if the volume of urine changes from one to another micturation must be mentioned.⁸

Analysis:

The term *tafsareh* means inspection is used for uroscopy in the writing of Arabian medical scholars. Sample identification is the first and most important step in the analytical phase of laboratory medicine. Properly labeled collected samples should be identified for sufficiency and originality. A freshly voided sample (within one hour) is most suitable for uroscopy but it should be allowed to settle before the examination. the urine sample is not appropriate for examination after 6hr of voiding. The sample should be inspected in a place with sufficient light but avoid exposure to direct sunlight rays which may cause deception in color identification. Urine samples brought for analysis should be assessed for originality. Hence, differentiated from other liquor.^{5,11}

Differentiation of human urine from the urine of other animals:

It is a tough task but some differentiating points are mentioned in the text of Unani medicine. Ibn Sina in his famous treatise the Al Qanoon fil tib mentioned that the urine of asses is like clarified butter as to turbidity and coarseness and the urine of beasts of burden is like asses but clearer. The Upper and middle part is clear while the lower is turbid in the urine of beasts of burden. The urine of sheep is almost colorless but tends to be light straw with oily sediment or without sediments. The urine of goats is without sediments and clearer than sheep's urine.¹⁰

Differentiation of human urine from the urine of other fluids:

if the urine sample appears clearer in closer view and denser if further away, then suspect for false sample. Acetous syrup and solution of water-honey, water-fig, water-saffron, and other similar solutions seem clearer if seen from nearer to the eye and if the distance between urine sample and eye increases it seems opaquer which is opposite to the property of urine. The sediments of fig water or herbal decoctions have no definite contour, do not move their position, and lodge along the side of the glass, not in the middle.⁵

Discussion

Sample collection, its handling, storage, and treatment facilitate the subsequent steps of uroscopy. Accessibility of various equipment and technique modified the traditional treatment of the sample. For example, the separation of sediments does not need a full amount of sample collection and a slow natural process of sedimentation, it can be done easily with the help of a centrifuge machine. Similarly, the presence of sperm, cell, caste, crystal, or micro-organisms can be identified easily by using a microscope, a colorimeter makes color identification easy. A large amount of data can be saved, analyzed, or communicated by using computers and the internet. But due to the large number of patients, and the bulk of samples, handled by different kinds of personnel, the use of machines in a separate laboratory unit needs a standard operative procedure for timely and precise result reporting. If uroscopy is practiced in a separate laboratory unit then all necessary information acknowledged during uroscopy should be communicated with the treating physician along with the final remark of uroscopy.

Conclusion

Uroscopy is an important diagnostic tool in Unani medicine. For accurate and precise results, the collection and handling of the sample are important. A properly labeled sample must be identified for sufficiency and originality before analysis.

Conflicts of Interest

Nil

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