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Review Article

Mutra Pariksha

The review study of Mutra Pariksha in the context of Ayurveda and Modern Medical Sciences

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Mutra is a Sanskrit technical term translating to "Urine". Mutra is the liquid form of Ahara-Mala. Function of Mutra is to carry away Kleda (watery waste) from the body. Mutra is important waste product of the body and its examination gives important information for the diagnosis and prognosis of the diseases and also health. It is a science of life with a holistic approach to health and personalized medicine. It is known to be a complete medical system that comprised physical, psychological, philosophical, ethical and spiritual health. In Ayurveda there are different types of Parikshavidhi (methods of examination) for the diagnosis of diseases. In Ashtavidh Pariksha, Mutra Pariksha is an important tool for diagnosis. It is not only a diagnostic tool & also prognosis criteria of urine examination developed by the Ayurvedic scholars like Tail Bindu Pariksha. Urine examination in Ayurveda is used in a systematic and scientific way for understanding the diagnosis and prognosis of the disease from Samhita Kala. This article aims at using this ancient wisdom to diagnose the medical conditions and to predict about their prognosis, and to study about how it can be applied along with Modern medical practice as a cost-effective diagnostic tool.

Keywords: Mutra Pariksha, Tailbindu Pariksha, Mutra, Astha Sthana Pariksha, UTI

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Introduction

In *Ayurveda* terminology the person is called *Swastha* one who have *Sama* (equivalent) *Dosha, Agni, Dhatu* & *Mala Kriya* and *Prasanna Aatma, Indriya & Mana*.**[1]**

*Mutra i*s one of the *Mala* of the body and its function is *Kledavahana* i.e., to excrete *Kleda* from body. *Malas* play an important role in maintenance of health. *Mutra* is made at the time of digestion of food. Excretion of *Malas* (i.e., *Purish, Mutra, Sweda* & seven *Dhatu's Mala*) from the body is very important for the healthy status of a person. If there is any disturbance in excretion, then this leads to disease formation*. Mutra* shows many physiological & pathological conditions of a person. So *Mutrapariksha* is mentioned in *Ashtasthana Pariksha* of *Rogparikshana* of the patient.**[2]**

The earliest reference regarding *Mutra Pariksha* is available in *Vahat* manuscript which was written during 9 -10th Century. In the 12th Century *Mutra Pariksha* was further detailed in *Vangasena Smahita*. After *Vangasena, Yogaratnakara* and *Basvaraju*, explained *Mutra Pariksha* in the 17 -18th Century. Afterwards *Madhavkara*, a Physician from 800 Century AD, also explained this, *Pariksha.* According to *Acharya Yogaratnakara* first *Rogaparikshana* is done completely and then treatment will start.**[3]**

Mutra Pariksha plays an essential role in *Ashtasthana Parikshana. Mutra Pariksha* gives knowledge about abnormal *Doshas,* diseased condition & prognosis of disease. In *Ayurveda* literature various examination methods are discussed, even then we majorly rely on modern parameters due to lack of proper understanding and explanations available in our texts.

According to *Acharya Yogaratnakara Tailabindhu Pariksha* is one among such modality explained by *Acharyas* of medieval period. Thus, enlighten to its various aspects is essential. *Tailabindhu Pariksha, Prameha Prakarana & Mutrakrichra* have specific references related to examination of urine. Knowledge carried through their texts was at brief with less explanation with reference to scientific description. Different types of the *Pariksha Vidhies* have been described by different *Acharyas* in different *Samhita. Acharya Yogaratnakara* has described the *Ashtasthan Parikhsavidhi*.

It is a one of the important *Parikhsa* which illustrate not only the methods of clinical examination but also some laboratory investigations. In this modern period, we are living a sedentary and stressful life. This is the main cause for the indication of various diseases. Intake of drinks & foods during urge for micturition, suppression of urge for urination and any injury etc. may cause *Mutravikara* (i.e., urinary tract disorders).**[4]**

In *Ayurveda* there are various *Pariksha Vidhi* described by the ancient *Acharyas* for diagnosis of the diseases. The *Tail Bindu Pariksha* is one of the specific diagnostic tools for the *Mutravikara.* Physician should evolve technical skill, scientific knowledge and human understanding to acquire complete knowledge for their technique and accordingly treat the treatable disease with care and devotion.**[5]** Improper observation of patients by physicians, which have not been described and diseases which have not been diagnosed accurately are going to confuse the physician.**[6]** That's why *Acharya Charaka* said that the doctor should examine the disease first then the drug and there after the management should be done.**[7]**

The one who knows the characters of disease, is well-versed in all therapeutic measures and is acquired with the proper measure of place and time succeeds undoubtedly.**[8]** Now a day the process of urinalysis includes physical, chemical, and microscopic examinations. Urine mid-stream clean collection is acceptable in most situations, but the specimen should be examined within two hours of collection. Cloudy urine often is a result of precipitated phosphate crystals in alkaline urine, but pyuria also can be the cause.

The strong odour of urine may be the result of a concentrated specimen rather than a urinary tract infection. Dipstick urinalysis is appropriate, but false-positive and false-negative results can occur. Specific gravity gives a reliable judgment of the patient's hydration status. Micro-haematuria can be caused by a variety of factors, i.e., from benign to life threatening. Glomerular, renal, and urologic causes of micro-haematuria can be differentiated by other elements of the urinalysis. Whereas transient proteinuria typically is a benign condition, persistent proteinuria requires further work-up. Uncomplicated urinary tract infections diagnosed by positive leukocyte esterase and nitrite tests can be treated without culture examination. **[9]**

Mutra as per *Ayurveda*

Etymological derivation of *Mutra*

According to *Charak Samhita Mutra* is derived from the word root "*Mutra-Prasrave*" that means to piss, to lose water etc. It is also known by the synonyms *'Prasrava*' and *'Drava Mala'*.**[10]** As per *Acharya Sushruta Mutra* is considered as *'Aharamala'.***[11]**

Definition of *Mutra*

According to *Acharya Sharangadhara, Rasa* is the nutrient portion of the food, while its non-nutrient portion is called *Kitta,* the liquid waste is brought to the *Basti* by the *Siras* and it assumes the name *Mutra.***[12]**

Formation of *Mutra* / Physiology of urine formation in *Ayurveda*

According to *Acharya Charaka* food after digestion takes two forms viz. *Prasada* and *Kitta* among this *Kitta* portion there takes place the formation of *Mutra.***[13]**

According to *Acharya Sushtruta*, *Pitta* situated between *Pakwashaya* and *Amashaya* by invisible mechanism, digests four types of foods and drinks, separates *Dosha, Rasa* urine and faeces and seated there itself supports, by its innate power, remaining seats of *Pitta* and also the body with functions of *Agni,* the name 'Digestive Fire' is given to this. *Dhamnis* going downwards carry down flatus, urine, faeces, semen, menstrual blood etc. While reaching *Pittashaya* they separate the essence of food and drinks cooked there in with heat and carry this to the body for nourishment and support to those going upwards and obliquely, they also segregate urine, sweat and faeces.**[14]**

As there is the case of involvement of *Maladharakala, Pachaka Pitta* and *Samana Vata* helps in the formation of urine. *Acharya Sushruta* mentioned that the fifth one among *Kala* is *Purishadhara* which, being situated in intestines, separates waste products within the bowels. This spreads all over the liver, intestines and viscera, the excrete-holding membrane separates waste products situated in *Unduka* (caecum). *Acharya Dalhana* under commentary of *Malam Abhivibhajate* and *Malam Vibhajate* meant that it separates waste products as urine and faeces.**[15]** *Samana Vata*, linked with *Agni,* moves in the organ where ingested food is undergoing digestion. It digests food and discriminates against its products.

Acharya Dalhana said in commentary of *Tajjanvisheshan* products of digestion such as *Rasa, Dosha*, urine and faeces.**[16]** As per *Acharya Vruddha Vagbhata*, wastes of food, the clear portion is *Mutra* and the solid portion is *Shakrut.***[17]** As per *Astanga Hridaya* the digested food gets divided into two parts viz., *Kitta* and *Sara.* The fine portion of waste product of food becomes *Mutra* and the solid portion becomes *Shakrut.***[18]** As per *Acharya Sharangadhara, Rasa* is the nutrient portion of the food, while its non-nutrient portion is called *Kitta, the* liquid waste is brought to the *Basti* by the *Siras* and it assumes the name *Mutra.***[19]**

Acharya Sushruta has clearly mentioned that the urine formation *a Mutrashaya* is the receptacle of urine, base of excrements i.e. *Maladhara* and an important vital organ i.e. *Pranayatanam Uttamam*. Urine carrying channels existing in *Pakvashaya* saturate the bladder *(Mutrashaya)* with urine constantly as rivers do for sea; thousands of openings of these channels are not visible due to subtleness (*Sukshmatvat*). This bladder is filled up with oozing of urine carried, day and night, by the channels from the region known as *Amasayantara* and as a new pitcher put in water up to the neck is filled (with water) from sides in the same way bladder is filled with urine.**[20]**

Properties of *Mutra*

Panchabhautika composition of *Mutra*

As per *Acharya Dalhana* on *Sushruta Samhita*, *Mutra* (Urine) is originated from *Jala* and *Anala (Agni) Mahabhuta.***[21]**

Quantity of *Mutra*

According to *Acharya Charaka*, *Vruddha Vagbhata* and *Laghu Vagbhata* the quantity of *Mutra* of four (4) *Anjali.***[22-24]**

Functions of *Mutra*

According to *Acharya Sushruta,* urine fills the bladder and eliminates *Jaliya Ansha* (watery content).**[25]** As explained by *Acharya Vruddha Vagbhata, Mutra* eliminates excess moisture (water) is of urine.**[26]**

Samanya Guna of *Mutra*

According to *Acharya Charaka* common qualities of urine are *Ushna* (hot), *Tikshna* (sharp/strong), *Aruksha* (unctuous), *Rasa Katu* (pungent) and *Lavana* (salt).**[27]**

As explained by *Acharya Bhavprakash* human urine can cure diseases of *Rakta,* scabies, and chronic poisons. It acts as a tissue vitalizer, penetrating and is alkaline and salty in taste.**[28]**

Procedure of *Mutra Pariksha* as per *Ayurveda* and Modern

The patient requested to collect urine in the morning around 5 o'clock either in a clean oval shaped open earthen pot or clean vessel. This should be maintained in stable condition, clearly and carefully examined during sunrise.**[29]** The first stream of the urine should be discarded rather taking mid-stream urine it should be properly examined then knowing the cause of the disease,

Physician should start treatment for patient's continuous wellbeing (cure).**[30]** According to *Acharya Yogaratnakara* Physician should wake patient when four *Ghatis* of last *Prahara* (quarter) of night remain i.e. at the early morning and make him/her pass urine, urine should be collected in a glass container then be tested continuously after sunrise (till some diagnosis is found). [31] As per *Ayurvedic* Pharmacopoeia of India*, Ghatika* is equivalent to 24 minutes as described in Monier William"s Dictionary and thus four *Ghatikas* on calculation comes around 1 hour 36minutes. From calculation, it is clear that time of collection should be 1 hour 36 min before sunrise. *Tail bindu Pariksha* should be done within one and half hour.**[32]**

Manifestation of *Vruddhi* and *Kashaya* of *Mutra*

Mutra Vruddhi Lakshana

Susruta[33]	Mutravridhi (Increase in quantity of urine), Muhurmuhu (Increase in frequency of urine), Bastitoda (Pain in bladder), Adhman (Distention of bladder)
Chakrapani[34]	Prachuramutra (Excessive flow of urine), Prachur Mutranirgam (Excessive outcome of urine), Muhurmuhu (Increased frequency of urine outcome)
Vruddha Vagbhata[35]	Bastitoda (Pain in urinary bladder), Adhman (Enlargement of urinary bladder)
Laghu Vagbhata[36]	Bastinistoda (Severe pain in bladder), Kriteapyakrich (Feeling of non-elimination of urine)

Mutra Kshaya Lakshana

Charaka[37]	Mutakricham (Dysuria), Mutravaivarnya (Discoloration of urine) Pipasa (Thirst), Mukhamparisushyati (Dryness in mouth)
Sushruta[38]	Alpamutrata (Scanty urine) Bastitoda (Pricking pain in pelvic region)
Vruddha Vagbhata[39]	Bastinistoda (Pricking pain in the bladder) Mukhsosha (Dryness of the mouth), Krichalpamutra (Elimination of little quantity of urine with difficulty), Vivranmutra (Different colored urine or mixed with blood)
Laghu Vagbhata[40]	Mutra Alpam (Scanty urine), Mutrakrich (Dysuria), Sarudhirmutrataya (Urine discolored or mixed with blood)

Physiology of urine formation

In general, urine consists of urea and other organic and inorganic chemicals dissolved in water. Urine is normally 95% water and 5% solutes, although considerable variations in the concentrations of these solutes can occur owing to the influence of factors such as dietary intake, physical activity, body metabolism, and endocrine functions.**[41]**

Urine formation plays an important human body. It usually helps in maintaining homeostasis by regulating volume & composition of body fluids. Kidneys are primary organs involved in this process, it filters blood to remove waste products and excess substances, finally producing urine.

There are three stages of urine formation -

1. Glomerular Filtration
2. Tubular Reabsorption
3. Tubular Secretion

A) Glomerular Filtration: The first stage in urine formation is called as glomerular filtration. Each kidney contains approximately 1 million nephrons, the functional units of filtration, with a key structure called the glomerulus at the center of each nephron. The glomerulus is a network of tiny blood vessels (capillaries) where blood filtration takes place. About 20% of the blood entering the glomerulus is filtered into the Bowman's capsule, the structure surrounding the glomerulus. This filtrate contains mostly of water, amino acids, glucose and nitrogenous wastes such as urea. The average human body has about 5 liters of blood, and the heart pumps approximately 1200 ml of blood through the kidneys each minute. Each kidney filters about 600 ml of blood per minute.

B) Tubular Reabsorption: The second stage is called as tubular reabsorption. It occurs in the renal tubules, a series of tubes within the nephron. In this stage, essential substances such as water,

Glucose, and specific ions are reabsorbed back into the bloodstream. Normally all the glucose and amino acids are absorbed. Under normal hydration conditions, approximately 99% of the water filtered by the glomeruli is reabsorbed, though this can vary with hydration status and hormonal influences such as antidiuretic hormone (ADH).

C) Tubular Secretion: The final stage or third stage is called as tubular secretion. It usually involves the movement of substances from the peritubular capillaries into the renal tubular lumen. This process eliminates unwanted materials such as excess potassium, hydrogen ions, and certain drugs from the blood. It plays an important role in regulating the body's acid-base balance and excreting substances that were not filtered out during glomerular filtration.**[42]**

Urinalysis as per modern

A urinalysis (also known as a urine test) is a test that examines the visual, chemical and microscopic aspects of the urine. It involves a variety of tests that detect and measure various compounds that pass through your urine using a single sample of urine. Healthcare providers often use urinalysis to screen for or monitor certain common health conditions, such as kidney disease, liver disease and diabetes, and to diagnose urinary tract infections (UTIs).

Some different aspects of your health can be tested with a urine sample. Physicians will choose which tests to order under a urinalysis depending on patient symptoms and situation.**[43]**

Normal urine output Urinary output in a normal adult person is 600 ml to 2500 ml /day.

Volume	Per day
Neonates	30-60 ml
10-60 days	250-450 ml
60-365 days	400-500ml

Children

Volume	Per day
1-3 years	500-600 ml
3-5 years	600-700 ml
5-8 years	650-1000ml
6-14 years	800-1400 ml

Specific gravity of urine

Neonates 1.002-1.030g/ml
Infants 1.002-1.006g/ml
Adults 1.003-1.030g/ml
p.H. Of urine 4.6-8.0 (Average pH.- 6.0)

Tests in urinalysis: The physician can include several different tests in a urinalysis. Depending on patient symptoms, existing health conditions, and/or situation, physicians will choose which urine tests to order under a urinalysis. In general, a physician or laboratory technician can examine a urinalysis urine sample for following broad aspects:

A) Color and appearance
B) Chemical findings
C) Microscopic findings**[44]**

Examination method of *Mutra as per Ayurveda*

1) Darshana - Examination for determining the *Varna* (color), *Sandrata* (consistency), *Samyoga* (Admixture) and *Tailabindu Gati* (spread of oil drop poured in urine).

2) Sparsana - The examiner dips finger into the specimen to detect qualities like *Sita* (cold), *Ushna* (hot), *Snigdha* (greasy), *Pichila* (slim)

3) Gandha - The normal and abnormal smell of the urine to be examined.

4) Rasana - It is usually not done directly. In previous times the physicians used to observe the swarming of flies, ants and other insects to the urine pot or the place where the patient had

5) Tail Bindu Pariksha.

Darshana Pariksha* / Visual examination as per *Ayurveda

Vaivarnya of *Mutra* (Discoloration of Urine)**[45]**

1) Sweta	Udakameha, Manasikaudwega, Atijalapana, Vatavyadhis, Yoshapasmara.
2) Pita/Haridra	Pitta Vruddi, Jwara, Kamala, Pittajaprameha like Haridrameha, Amavata, Raktapitta
3) Shukla	Kaphajaprameha such as Pistameha, Siktameha, Majjaroga
4) Krsna	Sannipatajajwara, Vrukkasopha, Kalameha
5) Kala/ Harita	Raktajarogas, Arista Lakshana

Colour/appearance of the Urine according to *Dosha* involved

Dosha involved	Urine color/appearance
Vata	Pandur (Whitish-yellow)
Pitta	Raktavarna (Red)
Kapha	Saphena (Frothy)
Dwandaja Dosha	Mishrit (Mixed)
Sannipata Dosha	Krishna (Black)

Diagnosis of disease involvement **[46]**

Disease	Urine colour
Ajirna (Indigestion)	Tandulodaka (rice water)
Navina Jwara (Acute fever)	Bahu Mutrata (The urine looks smoky and the affected person passes more urine)
Vata-Pitta Jwara	Urine is smoky, watery and hot
Vata- Shlesma Jwara	Urine is whitish with air bubbles
Shlesma-Pitta Jwara	Urine is polluted and is mixed with blood
Jirna (Chronic) Jwara	Urine appears yellowish and red
Sannipata Jwara	Urine appears in mixed shades depending on the Dosha involvement

Darshana Pariksha / Visual examination as per Modern

A) Color and appearance

Urine color and appearance	Diseases
Normal urine	Pale yellow (straw) in color
Colorless Dilution	Diabetes mellitus/ insipidus, nervousness, diuretic or alcohol intake
Milky Purulent	Genitourinary tract disease, chyluria
Orange	Urobilinogenuria, fever, excessive sweating, concentrated urine
Red	Beetroot ingestion, haematuria, haemo-globinuria, phenophthalein, pyridium, sulfonal
Greenish, Dirty blue or green Putrefying urine Dark brown, brown red, or yellow very concentrated urine Brown-yellow or brown red (if acidic) or bright red (if alkaline)	Jaundice, phenol poisoning Typhus or cholera, methylene blue Acute febrile diseases, Bilirubinuria Due to rhubarb, cascara, aloes
Brown, brown black or black	Haemorrhage in urinary tract if urine is acidic (Acid-haematin); haemoglobinuria; porphyria, methaemo- globinuria; myoglobinuria, melanin, phenol poisoning, homogentisic acid (alkaptonuria). In porphyria, urine turns dark brown on exposure to sunlight or boiling

Interfering Factors

Normally the urine darkens on standing. This occurs because of oxidation of urobilinogen to urobilin. Re Decomposition of urine commences in half an hour.

Some foods cause change in urine colour as shown below:

Foods	Urine colour
Beets	Red
Rhubarb	Brown

Many drugs are also responsible for urinary colour change:

Drugs	Urine colour
Cascara and senna laxatives	In acidic urine- Reddish-brown In alkaline urine-Red
Phenazopyridine (pyridium), amido-pyrine	Orange
Pyridium, ethoxazene	Orange/ orange red
Chlorzoxazome	Orange to purple red
Salicylazosulfapyridine, anisindone, or phenindione	In alkaline urine- Orange-yellow
Sulphonamides and nitrofurantoins	Rust-yellow to brownish color
Dilantin (dephenydantoin) dioctyl calcium sulphosuccinate, phenolphthalein and phenothiazine	Pink to red or red- brown
Phenolphthalein	Magenta color
Cascara	Brown-black color
Riboflavin or pyridium	In alkaline urine produce bright yellow color
Methylene blue and amitriptyline	Blue or green colored urine
Levodopa	Urine to darken on standing
Iron salt consumption	Dark colored urine
Phenothiazine tranquilizers	Pink to brown color
Triametrene	Pale blue color

"Clarity" is a general term that refers to the transparency or turbidity of a urine specimen. In routine urinalysis, clarity is determined in the same manner that ancient *Acharyas* used by visually examining the mixed specimen while holding it in front of a light source.

The specimen should, of course, be in a clear container. Colour and clarity are routinely determined at the same time. Common terminology used to report clarity includes clear, hazy, cloudy, turbid, and milky.

Normal Clarity: Freshly voided normal urine is usually clean, particularly if it is a mid-stream clean-catch specimen. Precipitation of amorphous phosphates and carbonates may cause a white cloudiness. **[47]**

Clarity	Term
Clear	No visible particulates, transparent
Hazy	Few particulates, print easily seen through urine
Cloudy	Many particulates, print blurred through urine
Turbid	Print cannot be seen through urine
Milky	May precipitate or be clotted

Sparshana Pariksha / Visual examination as per *Ayurveda*

1) Sita	Kapha Vruddi, Kaphajaprameha, Arista Lakshana
2) Ushna	Pitta Vruddi, Pittajaprameha, Tikshnavegajwara
3) Snigdha	Kapha Vruddi, Udararoga
4) Ruksa	Vata Vrudhi, Ksaudrameha

***Sparshana Pariksha* / sensational examination as per Modern**

In Modern we can co-relate *Sparshana Pariksha* with tactile sensation experienced in the body. Burning Micturition is the only reference regarding *Sparshana Pariksha*.

Burning Micturition	Causes Urinary tract infection, Urethritis, Cystitis, Prostatis and Prostitis, Kidney or bladder stones.

***Gandha Pariksha* / Odour examination as per *Ayurveda* 48]**

1) Nirgandha	Udakameha
2) Amlagandha	Nilameha
3) Madhugandha	Madhumeha
4) Vishragandha	Meda Kshaya, Prameha
5) Bastagandha	Ashmaripurvarupa
6) Putigandha	Ashmari, Vrukkarupa
7) Madhuragandha	Arista Lakshana

***Gandha Pariksha* / Odour examination as per Modern**

Although it is seldom of clinical significance & is not part of routine urinalysis, urine odour is noticeable physical property. Freshly voided urine has faint aromatic odour. As specimen stands, odour of ammonia becomes more prominent. The breakdown of urea is reason for characteristic ammonia odour. Causes of unusual odours include bacterial infections, which cause strong, unpleasant odour similar to ammonia, & diabetic ketones, which produce sweet or fruity odour. A serious metabolic defect results in urine with strong odour of maple syrup & is appropriately called maple syrup urine disease. This & other metabolic disorders with characteristic urine odours, Ingestion of certain foods, including onions, garlic, & asparagus, can cause an unusual or pungent urine odour. Studies have shown that although everyone who eats asparagus produces an odour, only certain genetically predisposed people can smell odour.

Common causes of urine odours are summarized as below: **[49]**

Odour	Cause
Aromatic	Normal
Foul, ammonia like	Bacterial decomposition, urinary tract infection
Fruity, sweet	Ketones (Diabetes mellitus, starvation and vomiting
Maple syrup	Maple syrup urine disease
Rancid	Tyrosinemia
Mousy	Phenylketonuria
Sweaty feet	Isovaleric academia
Bleach	Contamination

Tail Bindupariksha

Although *Tail Bindu Pariksha* can be considered under visual examination *(Darshan Pariksha)* but its utility is given by *Acharya Yogayatnakara* for the prognosis of disease hence it is explained in detail.

Patra of urine collection: Almost all *Ayurvedic* texts *Acharyas* has instructed to use glass container for *Taila Bindu Pariksha* except *Vangasena* who has stated that either glass or bronze vessel to be taken.

Collection of mid-stream urine: Mid- stream urine has to be collected for examination discarding the first and last part.

The oil: *Vasavarajiyam* had mentioned the use of *Til Taila* for *Tailabindu Pariksha* while other authors had just mentioned the word '*Tail*'. In the opinion of *Acharya Sharngdhar*, if the name of a particular oil is not mentioned, then *Til tail* should be taken.

Time of conducting *Taila Bindu Pariksha*: The various texts as *Yogaratnakara, Vangasenasamhita*, and *Vasavarajiyam* etc, have described the early morning time for the *Taila Bindu Pariksha* describing it by various names as *Suryodaye, Prabhate, Suryatape, Bhaskaro Udaye Bela* etc. **[50]**

Size of oil drop in *Ayurvedic* Classical texts, '*Trina*' was used to drop oil drop over surface of urine. In a Modern context, average volume of one oil drop is about 12.48 microliters. Around figure of 12 microliters was taken as standard for examination.

Height of oil drop: Approximately from a height of 5-10 cm.**[51]**

Prognosis of disease by examination of oil drop on urine surface spreading nature of the oil drop:

The oil should be dropped with the help of a blade of grass into the urine, in the presence of light.

A) If the oil drop spreads on the surface of the urine the ailment should be taken to be curable.
B) If the oil drop does not spread the ailment can be cured with difficulty.
C) If the dropped oil settles on the bottom then the disease is incurable.

This test was done by *Acharya Nagarjuna* himself.

By direction of the oil drop

A) If the oil drop spreads towards east then it should be thought that patient will be cured soon.

B) If the dropped oil spreads towards south then recovery should be thought to be gradual and the disease may be known to be fever.
C) If the oil drop spreads towards north then recovery of the patient is undoubtedly
D) If the drop spreads towards the west, the patient's recovery and happiness is indicated.
E) If the drop spreads towards *Isana* (north east) then the patient's death is certain by a month.
F) If the drop spreads towards *Agneya* (south east) or *Nairrtya* (south west) and holes appear on the expanded oil later on then the patient's death is certain.
G) If the drop spreads towards *Vayavya* (north-west) then the patient does not survive even if treatment is given to him.

By shape of oil drop

A) If the Urine displays complete figures of *Swan, Karanda* (a kind of bird), pond, lotus, elephant, canvara (bushy fan made of Yak Tail), umbrella, festoon, palace then thinking his recovery to be certain and his treatment should be initiated.
B) If the dropped oil displays the form of a plough, tortoise, buffalo, beehive, headless human body, (severed) body part, weapon, sword, *Musala*, *Pattisa* (kind of weapons), arrow, stick, junction of a three or four paths then the physician should not initiate his treatment at all.
C) If the oil drop shows the figure of a sieve then the disease should be thought to be caused by *Kuladosa* (result of some misdeed of the family members) or *Preta Dosa* (affliction of dead person's soul)
D) If it displays a human figure or two heads then the disease should be known to be caused by *Bhuta Dosa* (affliction of evil spirits) then it should be treated by a demonologist.
E) If the oil drop takes the shape of a snake then the ailment is caused by *Vata*, if it is like an umbrella then the cause of disease is *Pitta* disorder and if it forms a figure of pearl then the disease is caused by *Kapha*, these are the signs of urine (for determining the diagnosis). **[52]**

Purvarupa* related to *Mutra

Our *Acharyas* has mentioned some premonitory signs and symptoms related to different types of changes in urine that are helpful for the diagnosis of diseases which are as follows:

- In case of *Raktapitta* there is red, yellow and greenish discoloration of urine.**[53]**
- In case of *Gulma* there is non-manifestation of the urges for urine.**[54]**
- In case of *Prameha* the insects especially ants are attracted towards the urine as there is smell of raw flesh in urine.**[55]**

By these premonitory signs and symptoms, we can detect different diseases before its occurrence and cure it with the help of preventive measures.

Arista Lakshana* of *Mutra

According to *Acharya Charaka* if the semen, urine and faeces of a person sinks when placed on water and there is aversion for his own relatives, then he succumbs to death within one month.**[56]** A patient suffering from dyspnea, abdominal disease, lack of power of digestion passes hard stool and urine in condensed form, he cannot survive. If the abdominal oedema of the patient spreads to hands and feet, he dies after a prolonged illness.**[57]**

In view of *Acharya Vaghbhata* a person whose urine, faeces, sputum or semen sink in water, the sputum shows different colors, dies within a month. **[58]**

Authenticity of *Mutra Pariksha* in *Ayurveda*

In *Ayurveda* urine examination is one of the important examination methods to assess a person's health. The various changes in urine colour, odour, *Sparsha* etc can show various imbalances in the body. In the opinion of *Acharya Yogayatnakara* in case of *Vata* aggravation the urine is *Palish* (Whitish-yellow), and in *Kapha Dosha* the urine is *Saphena* (Frothy) and if *Pitta Dosha* is aggravated the urine is *Raktavarna* (Red). Due to lack of research in the field of *Ayurveda,* modern diagnostic tools are generally more accurate and reliable. However, *Ayurvedic Pariksha Vidhis* are still very useful. In general, we should focus on enhancing research work in the field of *Ayurveda*, for uplifting the *Ayurveda* and for healthy life.

Other than this there are Chemical and Microscopic examinations methods for urinalysis which are as follows:

B) Chemical findings in urine

In order to look at chemical aspects of a urine sample, physicians or lab technicians frequently use special test strips called dipsticks to test for some chemical substances in the urine sample.

The strips have pads of chemicals that change the colour when they come in contact with specific substances. The degree of colour change on the dipstick can provide an estimate of the amount of substance present in the urine sample. For example, a slight colour change in the test pad for protein shows a small amount of protein present in the urine sample, whereas a deep colour change may show a large amount. Some common types of tests that use a dipstick that providers may include in a urinalysis include

A) Protein urine test: A protein urine test estimates the presence of proteins, such as albumin, in your urine. Higher than normal urine protein levels may show various health conditions, such as dehydration, kidney issues and heart failure.

B) Urine pH level test: A urine pH test measures normal levels of red blood cells (RBC) in urine may be acid-base (pH) level in urine. An increased level of urine pH shows various health conditions such as urinary tract, kidney or bladder issues. Decreased level may indicate conditions including diarrhoea & diabetes related ketoacidosis.

C) Ketones urine test: Ketones build up when our body has to break down fats and fatty acids to use as fuel for energy. It mostly happens when our body does not get carbohydrates or sugar as fuel. Physicians mostly use ketone urine tests to detect diabetes related ketoacidosis.

D) Urine specific gravity test: The specific gravity test indicates the concentration of all chemical particles in urine. Abnormal results may show various different health conditions.

E) Bilirubin urine test: Bilirubin is a yellowish pigment found in bile, a fluid produced by the liver. If we found bilirubin in your urine, it shows liver or bile duct issues.

F) Nitrite urine test: A positive nitrite test result may show a urinary tract infection (UTI). However, not all bacteria are capable of converting nitrate (a substance that's normally in your urine) to nitrite, so we can still have urinary tract infection (UTI) after a negative nitrite test.

G) Leukocyte esterase urine test: Leukocyte esterase is an enzyme that's present in most white blood cells. When leukocyte esterase test is positive, it may show that there's inflammation in the urinary tract or kidneys.

The most common cause for white blood cells (WBC) in urine is bacterial urinary tract infection (UTI).

C) Microscopic findings in urine

A Physician or lab technician may investigate a urine sample under a microscope to look for tiny substances in the urine, including:

- Cell fragments.
- Urinary casts.
- Bacteria or other germs.

Microscopic tests that providers may include in a urinalysis include:

A) Red blood cell (RBC) urine test: The raised number of RBCs indicates that there's blood in your urine. However, this test can't identify where the blood is coming from. For example, contamination with blood from vaginal bleeding or haemorrhoids can't be distinguished from a bleed somewhere in your urinary system. In some cases, higher-than-normal levels of red blood cells in your urine may indicate bladder, kidney or urinary tract issues. There are also some chronic conditions that can lead to RBC in the urine.

B) White blood cell (WBC) urine test: The raised levels of White blood cells (WBC) and/or a positive test for leukocyte esterase may show an infection or inflammation somewhere in the urinary tract.

C) Epithelial cells: Epithelial cells are cells that form the covering on all internal and external surfaces of your body and line body cavities and hollow organs. The urinary tract is lined with epithelial cells. It's normal to have some epithelial cells in the urine, but increased numbers of epithelial cells may show infection, inflammation and/or cancer in your urinary tract.

D) Bacteria, yeast and parasites: Sometimes, bacteria can enter the urinary tract and urethra, causing a urinary tract infection (UTI). The urine sample can also become contaminated with bacteria, parasites and yeast, especially for people with a vagina. Yeast may infect the sample for people who have a vaginal yeast infection. Trichomonas vaginalis is a parasite that is also found in the urine of females because of vagina. It is the cause of asexual tract infection (STI) called trichomoniasis.

E) Urinary casts: Casts are tiny tube-like particles that can sometimes be present in the urine. They're made from protein released by your kidney cells. Some types of casts can show kidney issues, while others are completely normal.**[59]**

Conclusion

After a detailed discussion on *Ayurveda* and Modern methods of *Mutra Pariksha* (Urine examination) both examination techniques have their own importance. The ancient system of medicine i.e. *Ayurveda* is more based on observations rather than investigations. Laboratory investigations give the evidence and confirmation of the diagnosis. In ancient times thousands of years back some laboratory investigations (*Mala, Mutra, Rakta, Shtivan, Shukra* etc) were available and used while practicing *Ayurveda*. From the *Mutrapariksha* we know about *Sadhya-Ashadhya* of disease, *Doshas* involvement *Gandha, Varna* of the *Mutra* is given a major role to give knowledge about the *Dosha* involvement of disease. In general, the *Mutra Pariksha* helps in prognosis of diseases, curability and gives information about vitiated *Dosha, Arista* etc. In this time of modernization and advancement of Modern medical science urine examination is widely used for a diagnostic and prognostic purpose. In Modern medicine among all urine examinations visual examination is easy, cost effective, less time consuming etc. In rural, hilly and other backward areas where proper laboratory facilities are not available, *Ayurvedic* Physicians can use screening techniques such as *Tail Bindu Pariksha* and visual examination of urine. Various awareness campaigns should be carried out to make people aware about different types of colour changes in urine according to diseases. Hence *Mutra Pariksha* helps in prognosis of diseases, curability and gives information about vitiated *Dosha, Aristha* etc. and can help for uplifting the *Ayurveda.*

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