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Abstract

Background: Āyurveda defines health as a state of equilibrium among Doṣas, Dhātus, and Malās, with Mutra (urine) regarded as an important metabolic waste reflecting internal physiological and pathological changes. Mutra Parīkṣā, a component of Aṣṭa-Sthāna Parīkṣā, has traditionally been used to assess Doṣa imbalance, disease progression, and prognosis based on parameters such as colour, quantity, clarity, odor, and consistency, including specialized methods like Taila Bindu Parīkṣā.

Objective: This review aims to critically evaluate the concept and diagnostic relevance of Mutra Parīkṣā in Āyurveda and compare it with modern urinalysis.

Methods: This study adopts a narrative review methodology. Classical Āyurveda texts including Caraka Saṃhitā, Suśruta Saṃhitā, Aṣṭāṅga Hṛdaya, Yogaratnākara, and other related Saṃhitās were reviewed along with authoritative commentaries. Contemporary biomedical literature on urinalysis was analyzed to identify conceptual correlations. Data were synthesized to evaluate diagnostic convergence, divergence, and integration potential.

Results: The analysis demonstrates conceptual overlaps between Āyurveda and modern approaches in assessing metabolic and systemic disorders, while highlighting methodological differences. Āyurveda urine examination emphasizes qualitative, functional assessment, whereas modern urinalysis relies on quantitative biochemical measurements. These approaches exhibit complementary strengths, particularly in the early detection of multisystem disorders.

Conclusion: Integrating Mutra Parīkṣā with modern urinalysis may enhance diagnostic comprehensiveness. Standardization of observational parameters and interdisciplinary research are essential to validate correlations and support clinical integration.

Keywords: Mutra Parīkṣā, Taila Bindu Parīkṣā, Urinalysis, Āyurveda diagnostics, Aṣṭa-Sthāna Parīkṣā

Introduction

Āyurveda conceptualizes health as a dynamic equilibrium among Doṣa, Agni, Dhātu, and Mala, supported by mental and sensory well-being. Among the metabolic waste products, Mūtra (urine) plays a vital role in the elimination of excess fluid (Kleda), and alterations in urinary characteristics are considered reflective of underlying physiological and pathological processes. Consequently, urine examination occupies an important position in Āyurveda diagnostic methodology.

Mūtra Parīkṣā is an integral component of Roga Parīkṣā and is particularly valued for its non-invasive nature, ease of assessment, and ability to provide insights into systemic functional disturbances. Classical Āyurveda literature describes urine-based

indicators of Doṣa predominance, disease progression, and prognosis, emphasizing observable parameters such as colour, clarity, quantity, odor, and consistency. These observations underline the clinical relevance of urine examination as a functional diagnostic tool.

Despite its diagnostic importance, the application of Mūtra Parīkṣā in contemporary practice remains limited due to lack of standardized procedures, objective validation, and reproducibility. In contrast, modern urinalysis employs well-established biochemical and microscopic parameters to diagnose renal, metabolic, and systemic disorders with high precision. However, modern diagnostics may inadequately address the holistic and functional dimensions emphasized in Āyurveda assessment.

This disparity reveals a critical research gap in systematically evaluating Āyurveda urine examination in relation to contemporary urinalysis. The present review aims to critically examine the conceptual foundations, diagnostic parameters, and clinical relevance of Mūtra Parīkṣā and to compare them with modern urinalysis, with the objective of identifying areas of convergence, complementarity, and scope for integrative diagnostic frameworks in clinical practice.

Aim:

To review classical descriptions of Mūtra and Mūtra Parīkṣā in Āyurveda

Objectives:

- To review classical descriptions of Mūtra and Mūtra Parīkṣā in Āyurveda
- To analyze diagnostic parameters and prognostic indicators
- To correlate Āyurveda urine examination with modern urinalysis
- To explore integrative diagnostic possibilities and research gaps

Methodology:

This study adopts a narrative review methodology. Classical Āyurveda texts including Caraka Saṃhitā, Suśruta Saṃhitā, Aṣṭāṅga Hṛdaya, Yogaratnākara, Śaraṅgadhara Saṃhitā, Basavarājiyam, and Vaṅgasena were reviewed along with authoritative commentaries. Contemporary biomedical literature on urinalysis was analyzed to identify conceptual correlations. Data were synthesized to evaluate diagnostic convergence, divergence, and integration potential.

Results:

Etymological derivation of Mūtra:

According to Śabdakalpaduma, Mūtra is derived from the word root "Mūtra Prastraave" which means to piss, to lose water, etc. It is also known by the synonyms

'Prasrava' and 'Drava Mala' [1]. According to Acharya Suśruta, the Mūtra is considered the 'Ahara Mala' [2].

1 **Definition of Mūtra:**

According to Acharya Śaraṅgadhara, 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 Sira and is called Mūtra [3].

Anatomy and Physiology of Urine Formation:

Āyurveda texts, predating detailed modern anatomical descriptions, provided accounts of the organs involved in urine formation and elimination:

- Vrikka (Kidney): Described as a pair of rounded muscular organs located in the abdominal cavity (Koṣṭha), lateral to the back (Kukṣi). Some commentators suggest Vrikka is formed from Meda (fat). Blood (SaDoṣa Śonita) is transported to the Vrikka, where it undergoes purification (Śodhana) to form urine. This urine then travels to the Basti (bladder). Classical texts did not directly link the Vrikka to the explicit process of urine formation.
- Basti (Bladder): Considered a vital organ (Sādya Pranāhar Marma). It is described as a thin, membranous organ shaped like an Alabu (gourd) or Dhanurvakra (bow-shaped), with a single downward opening orifice, correlating with the modern urinary bladder.
- Gavini (Ureters): Not appearing in classical texts, but mentioned in the Atharvaveda as paired organs carrying urine from the intestines (Antra) to the Basti. Functionally, they resemble the ureters.
- Mūtra Praseka (Urethra): Described as originating from the lower end of the Basti and facilitating urine release. Its length is noted to differ between males and females and is comparable to the modern urethra.
- Mūtravāha Srotas, Nadīs, Dhamanīs, and Sira: These terms refer to various urinary tracts, channels, and vessels. Mūtravāha Dhamanīs are tasked with carrying urine to the Basti and continuing its retention and flow. Mūtravāha Sira continuously fills the bladder through a process called Niśyandana.

Mūtra Formation:

The formation of Mūtra (urine) in Ayurveda is intrinsically related to Āhāra (food), as both Mūtra and Puriṣa (feces) are regarded as waste products (Kitta Bhāga) generated during digestion. Classical texts describe digestion as a transformative process governed by Pācaka Pitta, Samāna Vāyu, and anatomical entities such as Kāla, particularly Puriṣādhāra Kāla, traditionally situated in the Pakvāśaya (large intestine) [4].

During digestion, ingested food is divided into a refined nutritive essence (Rasākhya or Sāra) and a waste fraction (Malākhya or Kitta). The nutritive component contributes to tissue nourishment, whereas the waste fraction forms Mūtra, Puriṣa, and Sveda (sweat). The liquid waste is transported through Mūtravāhi Dhamanīs and stored in the Mūtraśaya (urinary bladder) prior to excretion [4].

According to Acharya Caraka, after digestion, the Kitta portion of food is converted into Mūtra [5]. Acharya Suśruta states that Pitta, located between the Amāśaya and Pakvāśaya, digests all forms of food and drink, separates Doṣa, Rasa, Mūtra, and Puriṣa, and supports the body through its Agni function [6]. The formation of urine involves the coordinated action of Malādhāraka Kāla, Pācaka Pitta, and Samāna Vāta. Suśruta describes Puriṣādhāra Kāla as the fifth Kāla, responsible for separating waste materials within the intestines [7].

Acharya Dalhaṇa, while commenting on *malam abhivibhajate* and *malam vibhajate*, clarifies that these processes denote the separation of waste products such as Mūtra and Puriṣa [7]. Samāna Vāta, associated with Agni, moves within the digestive tract, facilitating digestion and differentiation of products. Dalhaṇa, in his commentary on *tajjanviśeṣa*, explains that digestion yields Rasa, Doṣa, Mūtra, and Puriṣa [8].

According to Acharya Vṛddha Vāgbhaṭa, the waste of food digestion consists of Mūtra, representing the clear liquid portion, and Śakrut, representing the solid portion [9]. Similarly, Aṣṭāṅga Hṛdaya states that digested food is divided into Sāra and Kitta, where the fine liquid waste becomes Mūtra, and the solid portion becomes Śakrut [10]. Acharya Śārṅgadhara describes Rasa as the nutritive portion of food and Kitta as the non-nutritive portion; the liquid waste is conveyed to the Basti by Sirās and is termed Mūtra [11].

Acharya Suśruta provides a detailed anatomical explanation, stating that the Mūtraśaya is the receptacle of urine, the base of excretory functions (Malādhāra), and an important Prāṇāyatana (vital organ). He describes numerous subtle urine-carrying channels arising from the Pakvāśaya, continuously filling the bladder, analogous to rivers filling the sea. Due to their subtlety (Sūkṣmatva), these channels are not grossly visible. Urine flows day and night from the region of Amāśayāntara, filling the bladder like a clay pot immersed in water [12].

Functions of Mūtra:

According to Acharya Suśruta, urine fills the bladder and eliminates Jālya Aṁśa (watery content) [13]. As explained by Acharya Vṛddha Vāgbhata, Mūtra eliminates excess Kleda (water) from the body [14].

Pañcabhāutika composition of Mūtra:

According to Acharya Dalhana in Suśruta Saṃ hitā, Mūtra (urine) originates from Jala and Anala (Agni) Mahāb

Mūtra Pramāṇa:

Samyak Mūtra Pramāṇa is 4 Anjali. The Pramāṇa is increased in Prameha, Pittaja Arśa, Aśmari, Sannipātaja Jvara, and Nava Jvara. The Pramāṇa is decreased in Atisāra (Pravāhika), Mūtra Kṣhaya, Viśucika, Udāra Roga, and Vāta Kuṇḍalika.

Mūtra Varṇa (Color of Urine): Avivarṇa

Table 1: Color of urine [16]

Mūtra	Doṣa
	Vāta
Frothy	Kapha
Mixed Color	Dvandhaja
Black	Sannipātaja
Kṛṣhṇa	Arśa,
Aruṇa	Jvara, Arśa,
Pīta	Jvara, Raktapitta, Pittaja Gulma
Gomed	Aśmari Lakṣaṇa, Mūtrasāda
Harita	Pittaja Jvara, Raktapitta Purva Rūpa, Pittaja Gulma
Bhāsmodaka	Aśmari Lakṣaṇa, Mūtra Śukra

Clarity: Samyak Mūtra is clear.

Table 2: Significance of Clarity of Urine [16]

	Udaka Meha
	Śukra Meha
	Majja Meha
Like	Jalodāra
	Sura Meha
	Sandra

Gandha (Odor):

Acharya Suśruta mentioned Samyak Mūtra Lakṣaṇa in Chikitsā Sthāna Adhyāya 12, verse 20. Acharya Kaśyapa has mentioned the normal Gandha of Mūtra. According to him, Mūtra is Nāṭigandhī, i.e., an odor which is not irritating.

Table 3: Odor of urine [16]

Odor	Disease
Viśra Gandha	Pittaja Arśa
Baṣṭa	Aśmari
Vid	

Amagandhi	Manjistha

Rasa:

According to Caraka and Suśruta, the Rasa of normal urine is Katu and Lavana; according to Acharya Harita, it is Kṣhāra, Katu, and Madhura [16].

Sparśa:

Uṣṇa (when freshly passed, it is slightly warm) [16].

Ghanatva:

Normal urine is Drava (liquid), Sāra (with low density), and Laghu (light) [16].

Ārista Lakṣaṇa of Mūtra:

According to Acharya Caraka, if the semen, urine, and feces of a person sink when placed on water and there is aversion for his own relatives, then he succumbs to death within one month [17]. A patient suffering from dyspnea, abdominal disease, lack of digestive power, passes hard stool and urine in condensed form, and he cannot survive. If the abdominal edema of the patient spreads to the hands and feet, he dies after a prolonged illness [18]. According to Acharya Vāgbhata, a person whose urine, feces, sputum, or semen sinks in water, and the sputum shows different colors, dies within a month [19].

Taila Bindu Parīkṣā (Oil Drop Examination) of Urine:

Taila Bindu Parīkṣā is a traditional Āyurveda diagnostic method that addresses the prognosis of various health conditions by observing how an oil drop interacts with urine. Unlike standard urinalysis, which focuses on identifying physiological abnormalities through chemical and microscopic analysis, Taila Bindu Parīkṣā offers insights into the body's energetic imbalances.

This method can answer specific clinical questions about disease progression and possible solutions that may not be apparent from conventional testing. Through this approach, practitioners gain prognostic information to guide personalized treatment, especially when standard urinalysis does not fully capture a patient's holistic health.

To validate Taila Bindu Parīkṣā, controlled clinical studies comparing its diagnostic accuracy with modern methods would be useful. Randomized clinical trials and cross-sectional studies could provide valuable data, while biochemical analyses could clarify the molecular mechanisms underlying the interaction between oil and urine. Building a systematic body of evidence would deepen understanding of its clinical utility and support further research-based integration into broader diagnostic frameworks.

S.O.P. for Taila Bindu Parīkṣā [16]:

Time of Urine Collection:

Various texts, such as Yogaratnākara, Vaṅgasena Saṃhitā, Hansarāja Nidāna, Basavarājiyam, etc., have described the early morning time for performing Taila Bindu Parīkṣā, described by various names: Sūryodaye, Prabhate, Sūryatāpe, Bhāskaro Udaye Bēlā, etc.

Yogaratnākara and Vaṅgasena stated that the ideal time for collecting urine is 4 ghatikas left in the last yāma of the night. In a day, there are eight yāma, and in one yāma, there are three hours. According to Monier-Williams' dictionary, adopted by the Āyurveda Pharmacopoeia of India, ghatikas are equivalent to 24 minutes. Four ghatikas on calculation come around 1 hr 36 min. Therefore, the collection time is 1 hr 36 min before sunrise.

Patra (Container) for Collection of Urine:

In Āyurveda texts, a glass container is recommended for collecting urine. Vaṅgasena stated that either glass or bronze vessels should be used.

Collection of Midstream Urine:

Midstream urine should be collected for examination.

The Oil:

In Āyurveda texts, Til Tail (sesame oil) is mainly used for urine examination. According to Acharya Śaraṅgadhara, when no clear description is given, Til Tail should be taken.

Size of Drop:

According to Āyurveda texts, Trīṇā (dropper) should be used to drop the oil onto the surface of the urine. According to a study, the average volume of a single drop is around 12 µL.

Procedure:

Using a Trīṇā (dropper)/micropipette, the oil is dispensed into a glass container, with the solution level no more than 1 cm above the urine surface.

Observation:

Observe the shape, direction of spread, and appearance of the oil drop.

Table 4: Oil drop appearance according to Doṣa involvement [16]

Oil drop Appearance	Doṣa
Like Snake	Vāta
Like Umbrella	Pitta
Like Pearl	Kapha
Taila Bindu takes Chālinī (Sieve) shape	Kula Doṣa
Taila Bindu takes Nārakāraṇa (Human shape)	Bhūt Doṣa

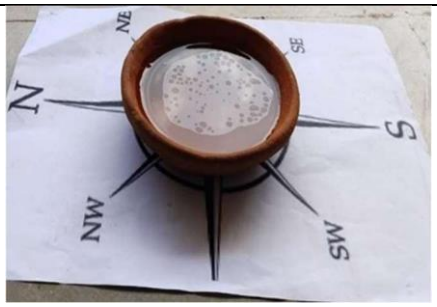

Figure 1: Chalinivat [20]

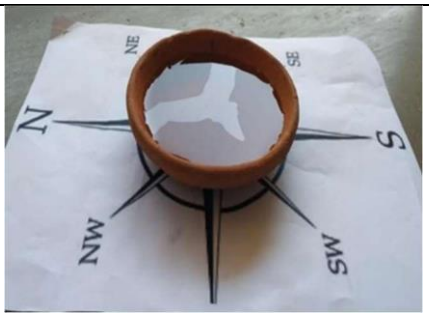

Figure 2: North-West Movement of Tailabindu [20]

Figure 3: Quick spread of Tailbindu [20]

Figure 4: Chamara [20]

Direction of Spread of Oil Drop:

- If the Taila Bindu spreads to the east, the disease will be cured very soon.
- Southward: patient develops Jvara, recovery takes longer.
- Northward: patient will definitely recover.
- Westward: patient recovers and achieves happiness.
- Iśāna (northeast): patient will die within a month.
- Āgneya (southeast) and Nairṛtya (southwest): patient's death is certain.
- Vāyavya (northwest): patient will die soon.

Table 5: Prognosis by spreading direction of oil [21]

Direction	Result
East	Good prognosis, patient becomes healthy quickly
South	Patient suffers fever; recovery gradual
North	Patient will be free from disease
West	Patient becomes healthy and happier
Northeast	Patient dies within a month
Southeast / Southwest	Death of the patient
Northwest	Patient is going to die

Table 6: Prognosis based on speed of oil drop spread [16]

Behavior of Oil Drop	Prognosis of Disease

Spreads fast over urine	Sādhya (Good prognosis)
Spreads very slowly	Kṛichasādhya (Difficult to treat)
Settles at bottom of pot	Asādhya (Bad prognosis)

Table 7: Diagnosis of disease based on appearance of urine [16]

	Śukla Meha
	Śukra Meha
Kṣhāra	Kṣhāra Meha
	Kāla Meha
	Nīla Meha
color	Rakta Meha
Decoction of Manjistha	Manjistha Meha
Like color of turmeric water	Haridrā Meha
Pandu Varṇa	Madhu Meha
Rakta Pitta	Kamala, Uṣṇavāta
Kṛṣhṇa Pitta	Kumbha Kamala
Rakta	Pittaja Mūtrakṛichā

Table 8: Diagnosis based on character of urine [16]

	Diagnosis
	Prameha
	Kaphaja Mūtrakṛichā
Tantubaddha, Pīchila	Alala Meha
Bindu Bindu Sarvati	

Table 9: Shape related to Sādhya conditions (Good Prognosis) [16]

Hansa		Yogaratnākara, Vaṅgasena
Karanda	honeycomb,	Yogaratnākara, Yog Taraṅgini
Tadaga	Tank, pool	Yogaratnākara, Vaṅgasena, Hansarāja
		Yogaratnākara,
Gaja		Yogaratnākara, Yog Taraṅgini, Basavarājiyam
Chamara	Plume on horse heads (Chowrie)	Yogaratnākara, Yog Taraṅgini, Basavarājiyam
Tarana	Arch, arched doorway, triangle supporting large balance	Yogaratnākara, Yog Taraṅgini, Basavarājiyam
Harmya	Large house, palace, mansion, residence of wealthy person	Yogaratnākara, Yog Taraṅgini
Parvat	Shape of mountain	Basavarājiyam

Vṛkṣha	Tree bearing flowers/fruits	Basavarājiyam
		Basavarājiyam

Table 10: Shape related to Āsādhya Condition [16]

	Indicates	
Hala	curved	Yogaratnākara, Basavarājiyam, Vaṅgasena Saṃhitā
Kurma	A tortoise, turtle	Yogaratnākara, Basavarājiyam, Yog Taraṅgini, Vaṅgasena Saṃhitā
Sairibha	Buffalo	Yogaratnākara, Basavarājiyam, Yog Taraṅgini
	A man without head	Yogaratnākara, Basavarājiyam,
Gatra Khaṇḍa	Part of body or limb	Yogaratnākara, Basavarājiyam,
Śastra	weapon used for cutting or wounding	Yogaratnākara, Basavarājiyam, Yog Taraṅgini
Khadga	A sword, long weapon	Yogaratnākara, Basavarājiyam, , Hansarāja
Muṣala	used for cleaning rice	Yogaratnākara, Basavarājiyam, Yog Taraṅgini
Pattīsa	points	Yogaratnākara, Basavarājiyam, Yog Taraṅgini
Sāra	Sort of reed or grass, an arrow	Yogaratnākara, Basavarājiyam, Taraṅgini
Lāduḍā	Stick, staff, club	Yogaratnākara, Basavarājiyam,
Tricatuṣpatha	Way, path, road	Yogaratnākara, Basavarājiyam,
Khara	also or	Vaṅgasena, Basavarājiyam
Vṛścika	or	Basavarājiyam, Hansarāja Nidāna
		References
Hala	curved	Yogaratnākara, Basavarājiyam, Vaṅgasena Saṃhitā
Kurma	A tortoise, turtle	Yogaratnākara, Basavarājiyam, Yog Taraṅgini, Vaṅgasena Saṃhitā

Note: While Taila Bindu Parīkṣā offers unique prognostic insight, its subjective nature and lack of controlled validation limit its current clinical applicability, warranting systematic research.

Table 11: Another Shape related to Āsādhya Condition [16]

Hansarāja Nidāna	Basavarājiyam
Kṣura, Daṇḍa, Kodanda, Tuṇira, Gadā, Cakra, Vikṛitakṛiti, Bheri, Duṇḍumbhi, Śaṅkha, Gomukha, Tūri, Mṛidaṅga, Viṇā,	Marjara, Vṛṣha,

Table 12: Relation between Physical Appearance of Urine and Disease [16]

sandal	Indigestion
S	Jvara
color	Chronic Jvara
	Vāta-Pitta Jvara
	Vāta-Kapha Jvara
	Kapha-Pitta Jvara
Doṣa	Sannipātaja Jvara
color,	Physical disease
	Disease
	Indigestion
S	Acute Jvara
color	Chronic Jvara
	Vāta-Pitta Jvara
	Vāta-Kapha Jvara
	Kapha-Pitta Jvara
Doṣa	Sannipātaja Jvara
color,	Physical disease

Table 13: Relation between Characteristics of Mūtra and Various Disorders [22]

Characteristics of Mūtra	Various Disorders
Accha Mūtra	Aśmari, Udaka Meha
Amla Mūtrata	Amla Meha, Nila Meha
Mūtrakṛiccha	Aśmari Pūrvarūpa, Kaphaja Arśa, Gulma Saṃānya Lakṣaṇa
Śukraśmari	Śarkara, Mūtranirodhaja Udavarta
Kṛiṣhṇa Mūtrata	Vātaja Arśa, Kamla Āsādhya Lakṣaṇa, Vātaja Pandu, Vātaja Svarbheda, Kāla Meha
Lavana Mūtrata	Lavana Meha, Lohita Meha, Rakta Meha
Mūtralpata	Vātaja Aśmari, Mutrotsaṅga, Vātakuṇḍalika, Vātaja Mūtrakṛiccha, Sanair Meha
Madhura Mūtrata	Iksuvalika Meha, Kṣaudra Meha, Madhumeha, Sīta Meha
Muhumuhu Mūtrapravṛitti	Vātaja Aśmari, Pittaja Mūtrakṛiccha, Vātaja Mūtrakṛiccha, Sanair Meha
Pićchila Mūtra	Lāla Meha, Udaka Meha
Pīta Mūtrata	Kamla Āsādhya Lakṣaṇa, Pittaja Mūtrakṛiccha, Mūtrasāda, Pittaja Pandu, Pandu Pūrvarūpa, Pittaja Prameha, Pittaja Svarbheda, Uṣṇavāta
Prabhuta Mūtrata	Pravruddha Amavāta, Prameha Pratyātma Lakṣaṇa, Sīta Meha, Udaka Meha

Saruja Mūtrata	Aśmari, Pittaja Mūtrakṛiccha, Mūtrakṣhaya, Mutrotsaṅga, Vātakuṇḍalika
Śukla Mūtrata	Mūtrasāda, Kaphaja Pandu, Piṣṭa Meha, Udaka Meha
Viśra Mūtraṁ	Manjistha Meha, Rakta Meha
Rakta Pīta Mūtrata	Kamla
Śarakta Mūtrata	Aśmari, Pittaja Mūtrakṛiccha, Mūtrasāda, Pitta Avṛita Apānvāyu, Rakta Meha, Adhoga Raktapitta, Uṣṇavāta
Mutrābādha / Mutrotsaṅga / Mutrāvārodha	Purīṣaja Anaha, Antarvidrādhi Āsādhya Lakṣaṇa, Vātaja Sthila, Vāta Duṣṭijanya Bālroga, Gudgata Vāta, Kaphavṛita Samāna, Koṣṭhaśrita Vāta, Mudhagarbha, Mūtra Saṅga Lakṣaṇa, Mūtraghāta Roga, Śarkarāja Mūtrakṛiccha, Niruddha Prakāśa, Vātaja Pariṇāmsūla, Pratyasthila, Śarkara Āsādhya Lakṣaṇa, Mahā Śvāsa, Śukra Nirodhaja Udavarta, Vātaja Udavarta, Vāta Basti, Viśucika Upadrava
Prabhuta Mūtrata	Pravruddha Amavāta, Prameha Pratyātma Lakṣaṇa, Sīta Meha, Udaka Meha

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 [23]. Urine formation plays an important role in maintaining homeostasis by regulating the volume and composition of body fluids. The kidneys are the primary organs involved in this process, filtering blood to remove waste products and excess substances, ultimately producing urine.

There are three stages of urine formation:

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

A) Glomerular Filtration:

The first stage of urine formation is glomerular filtration. Each kidney contains approximately 1 million nephrons, the functional units of filtration, with a key structure, 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, which contains mostly 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 tubular reabsorption, occurring in the renal tubules. Essential substances such as water, glucose, and specific ions are reabsorbed into the bloodstream. Normally, all glucose and amino acids are absorbed. Under normal hydration, approximately 99% of the water filtered by the glomeruli is reabsorbed, though this varies with hydration status and hormonal influences such as antidiuretic hormone (ADH).

C) Tubular Secretion:

The final stage involves tubular secretion, where substances move from the peritubular capillaries into the renal tubular lumen. This removes excess potassium, hydrogen ions, and certain drugs from the blood, regulating acid-base balance and excreting substances not filtered by the glomerulus [24].

Urinalysis in Contemporary Medicine

A urinalysis (urine test) examines the visual, chemical, and microscopic aspects of urine. It detects and measures compounds excreted in a urine sample. Urinalysis is used to screen for or monitor kidney disease, liver disease, diabetes, and urinary tract infections (UTIs). Tests are chosen based on patient symptoms and clinical context [25].

Normal urinary output in an adult is 600–2500 ml/day.

Table 14: Volume of Urine per Day in Different Ages [26]

Age	
	1000 ml
Children	

Specific gravity of urine:

- Neonates: 1.002–1.030 g/ml
- Infants: 1.002–1.006 g/ml
- Adults: 1.003–1.030 g/ml

pH of urine: 4.6–8.0 (average 6.0)

Tests in Urinalysis

Physicians can examine urine for:

A) Color and appearance

B) Chemical findings

C) Microscopic findings [27]

Darśana

(Visual Examination):

Visual examination determines Varṇa (color), Saṃdratā (consistency), Saṃyoga (admixture), and Taila Bindu Gati (spread of oil drop poured in urine). In Ayurveda, Panchendriya (five senses) are used in diagnostics:

- Sight (Darśana) for visual cues
- Touch (Sparśa) for texture and temperature
- Taste (Rasa) for metabolic imbalance
- Smell (Gandha) for metabolic byproducts
- Sound (Śabda) for body rhythms

Steps in Darśana:

1. Examine Varṇa, Saṃdratā, Saṃyoga, and Taila Bindu Gati.
2. Observe color and appearance.

Table 15: Relation of Color and Appearance of Urine with Disease [26]

Urine Color/Appearance	Diseases
Normal urine	Pale yellow (straw)
Colorless dilution	Diabetes mellitus/insipidus, nervousness, diuretics, alcohol intake
Milky/purulent	Genitourinary tract disease, chyluria
Orange	Urobilinogenuria, Jvara, excessive sweating, concentrated urine
Red	Beetroot ingestion, haematuria, haemoglobinuria, phenolphthalein, pyridium, sulfonal
Greenish/dirty blue	Putrefying urine
Dark brown/brown-red	Jaundice, phenol poisoning, typhus, cholera, methylene blue, acute febrile disease, bilirubinuria, rhubarb, cascara, aloes
Brown/black	Hemorrhage in urinary tract, porphyria, methaemoglobinemia, myoglobinuria, melanin, phenol poisoning, alkaptonuria

Note: Normally, urine darkens on standing due to oxidation of urobilinogen to urobilin. Decomposition commences within half an hour.

Table 16: Relation Between Foods and Urine Color [26]

Foods	Urine Color
Beets	Red
Rhubarb	Brown

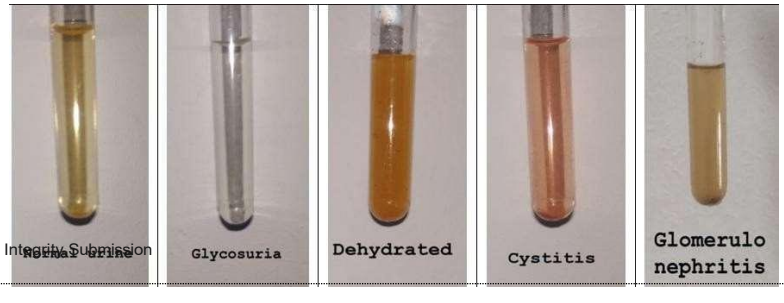

Fig 5: Showing different Colors of urine in various conditions [20]

Table 17: Relation Between Drugs and Urine Color [26]

Drugs	Urine Color
Cascara/senna laxatives	Acidic urine: reddish-brown; Alkaline urine: red
Phenazopyridine (pyridium), amido-pyrine	Orange
Pyridium, ethoxazene	Orange/red
Chlorzoxazone	Orange to purple-red
Salicylazosulfapyridine, anisindone, phenindione	Alkaline urine: orange-yellow
Sulfonamides, nitrofurantoins	Rust-yellow to brownish
Dilantin, dioctyl calcium sulphosuccinate, phenolphthalein, phenothiazine	Pink to red/brown
Riboflavin, pyridium	Bright yellow (alkaline urine)
Methylene blue, amitriptyline	Blue/green
Levodopa	Darkens on standing
Iron salts	Dark colored
Phenothiazine tranquilizers	Pink to brown
Triamterene	Pale blue

Clarity of Urine:

Refers to transparency or turbidity, determined visually in a clear container. Common terms: clear, hazy, cloudy, turbid, milky. Normal clarity: freshly voided, midstream, free from amorphous precipitates.

Table 18: Relation Between Clarity and Particles in Urine [26]

	visible
	not visible
	clot

1) Sparśana (Touch Examination)

The examiner dips a finger into the urine specimen to detect qualities such as Śīta (cold), Uṣṇa (hot), Snigdha (greasy), and Pichila (slimy).

Burning Micturition: Causes include urinary tract infection, urethritis, cystitis, prostatitis, kidney stones, or bladder stones.

2) Gandha (Odor Examination)

The normal and abnormal smell of urine is examined. Although seldom clinically significant and not part of routine modern urinalysis, urine odor is a noticeable physical property. Freshly voided urine has a faint aromatic smell. As the specimen stands, the ammonia odor becomes more pronounced due to the breakdown of urea.

Unusual urine odors may arise from:

- Bacterial infections → strong, unpleasant odor similar to ammonia
- Diabetic ketones → sweet or fruity odor
- Metabolic disorders → e.g., maple syrup urine disease with characteristic maple syrup odor
- Foods such as onions, garlic, and asparagus → pungent odor; interestingly, only genetically predisposed individuals can smell the asparagus odor

Table 19: Relation of Gandha of Mūtra with Vyādhi [26]

Gandha	Vyādhi
	Kṣaya,
	Aśmārī Pūrvā Rūpā
Puṭigandha	Aśmārī, Vṛkka Rūpā
Madhuragandha	Arisṭa Lakṣaṇa

Table 20: Relation of Urine Odor with Cause [26]

Rancid	Tyrosinemia

3) Rasana (Taste Examination)

Direct tasting is usually not done today. Historically, physicians observed the attraction of flies, ants, and other insects to the urine pot to infer metabolic characteristics.

4) Taila Bindu Parīkṣā

Purvārūpa (Premonitory Signs) Related to Mūtra:

Classical texts describe premonitory signs and symptoms related to different types of urine changes, which help in early diagnosis:

- Raktapitta: Red, yellow, or greenish discoloration of urine
- Gulma: Non-manifestation of urges for micturition
- Prameha: Insects, especially ants, are attracted to urine due to the smell of raw flesh [30]

These premonitory signs allow detection of diseases before full manifestation, enabling preventive measures and early intervention.

Authenticity of Mūtra Parīkṣā

In Ayurveda, Mūtra Parīkṣā is an important tool for assessing health. Changes in urine color, odor, or touch can indicate different imbalances in the body. According to Acharya Yogaratnakara, Vāta aggravation leads to whitish-yellow urine, Kapha causes frothy urine, and Pitta results in red urine. Although modern laboratory tests are generally more precise and reproducible, classical Ayurveda examination methods remain useful. More research into these traditional methods could enhance their applicability and support integrative healthcare.

Modern Chemical and Microscopic Examination of Urine

B) Chemical Findings in Urine

Chemical examination of urine is usually performed using dipsticks or test strips, which contain pads impregnated with chemicals that change color upon contact with specific substances. The intensity of color change provides a semi-quantitative estimation of the substance present. Common tests include:

1. Protein Urine Test: Detects proteins, such as albumin. Elevated levels may indicate dehydration, kidney disease, or heart failure.
2. Urine pH Test: Measures acidity/alkalinity. Elevated pH may indicate urinary tract, kidney, or bladder issues; decreased pH may indicate diarrhoea or diabetic ketoacidosis.
3. Ketone Urine Test: Detects ketones produced during fat metabolism, often used to monitor diabetic ketoacidosis.
4. Urine Specific Gravity Test: Indicates urine concentration and solute content; abnormal results may suggest various health conditions.
5. Bilirubin Urine Test: Detects bilirubin; presence suggests liver or bile duct disorders.
6. Nitrite Urine Test: Positive results may indicate urinary tract infection (UTI); however, not all bacteria produce nitrite.
7. Leukocyte Esterase Urine Test: Positive results indicate inflammation or infection in the urinary tract.

C) Microscopic Findings in Urine

Microscopic analysis identifies cellular and particulate elements, including:

1. Red Blood Cells (RBCs): High counts indicate hematuria; may arise from bladder, kidney, or urinary tract pathology.
2. White Blood Cells (WBCs): Elevated counts suggest infection or inflammation.
3. Epithelial Cells: Lining cells from the urinary tract; increased numbers indicate infection, inflammation, or malignancy.
4. Bacteria, Yeast, Parasites: Presence may indicate infection; contamination is possible. Trichomonas vaginalis can appear in female urine samples.
5. Urinary Casts: Tube-like protein structures; certain types indicate kidney pathology, others are normal [28].

Discussion

Comparative evaluation of Ayurveda Mūtra Parīkṣā and modern urinalysis reveals opportunities for integrative clinical application. Traditional Ayurveda urine examination provides early functional insights into systemic imbalances, while modern urinalysis offers objective, quantitative confirmation. Integrating these methods may enhance early detection, risk stratification, and prognosis, particularly in chronic and multisystem disorders such as diabetes, metabolic syndrome, and renal dysfunction.

Standardized observational parameters from Mūtra Parīkṣā, including Taila Bindu Parīkṣā, can potentially serve as screening or adjunctive tools, guiding further laboratory investigations. Proper standardization, clinician training, and validation through controlled clinical studies are crucial. Once scientifically validated, Taila Bindu Parīkṣā could become a low-cost, non-invasive prognostic tool, particularly useful in resource-limited settings.

Figures (Examples of Taila Bindu Spread Patterns) [29]

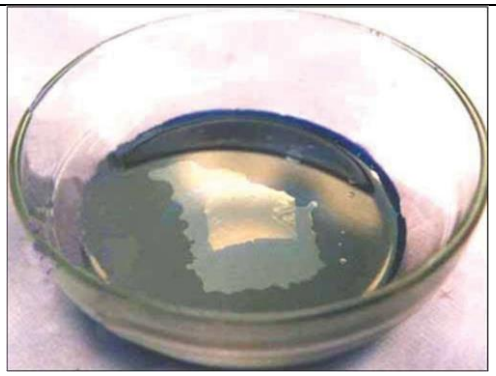

Fig 6: Spreading of oil without yellow tinged urine of Kamala Patient [29]

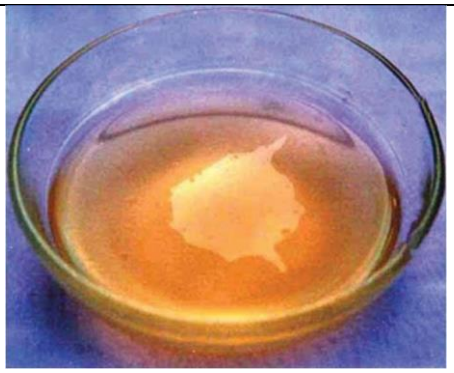

Fig 7: Reddish yellow tinged urine of Kamala Patient (Hep B) with demon or tiger shaped oil spread pattern [29]

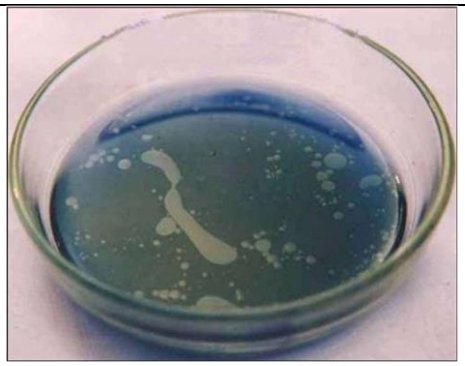

Fig 8: Snake shaped oil spread pattern in Viral fever patient [29]

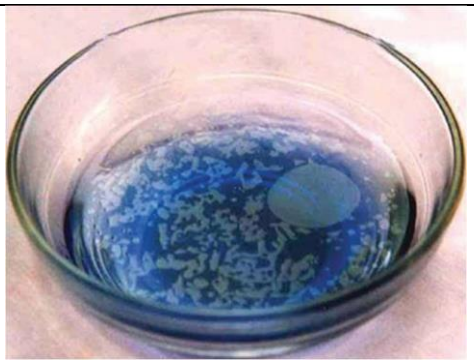

Fig 9: Budbuda shape oil spread pattern in viral fever patient [29]

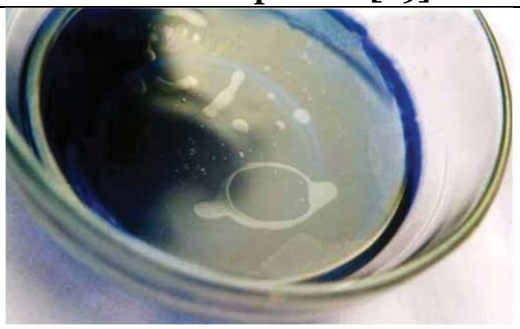

Fig 10: Ring shape oil spread in Pandu (Anemia) Patient [29]

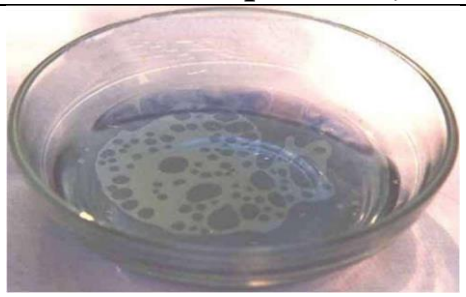

Fig 11: Sieve shape oil spread in Amavata (Rheumatoid Arthritis) patient [29]

Fig 12: Owl shape oil spread in Madhumeha (Diabetes) patient [29]

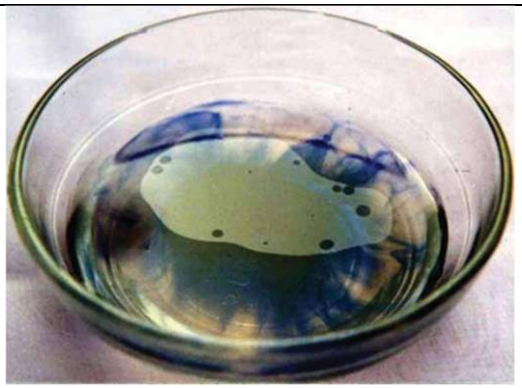

Fig 13: Skull shape oil spread in Amavata (Rheumatoid Arthritis) patient [29]

Conclusion

Mūtra Parīkṣā provides valuable functional insights into disease processes, particularly regarding Doṣa imbalance and prognosis. While modern urinalysis offers objective, quantitative precision, Ayurveda urine examination contributes a holistic interpretative framework.

Integrating both approaches can enhance diagnostic depth and patient management. However, due to the subjective nature of traditional assessment,

standardization and scientific validation are essential. Further interdisciplinary research is required to establish reproducible methodologies and support evidence-based clinical integration.

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