

Revisiting the Medicinal Role of Cow Urine: From Tradition to Evidence

Naresh Kothari¹, Pankaj Kumar²

¹Laboratory of Public Health Entomology, Department of Zoology, Mohanlal Sukhadia University,
Udaipur, Rajasthan, India

²Department of Emergency Medicine, Vardhman Mahavir Medical College and Safdarjung Hospital,
New Delhi

Corresponding author email: nitukothari95@gmail.com

Abstract:

In Ayurveda, cow urine has been used as a traditional medicine for management of various physiological and pathological conditions. Contemporary experimental evidence shows that it has antioxidant, antimicrobial, anti-inflammatory, antidiabetic, anticancer, immunomodulatory and osteogenic properties, which are mostly due to its bioactive constituents. It has also been considered as a natural reducing and stabilizing agent for green synthesis of pharmaceutically important nanomaterials. Most of the evidence is limited to in vitro and animal studies with inadequate clinical validation. This review provides a comprehensive overview of the traditional and contemporary medicinal uses of cow urine. Further, it discusses the current scientific evidence and future directions required to assess its possible application in integrative healthcare.

Keywords: cow urine; traditional medicine; pharmacological; bioactive compounds; integrative medicine

1. Introduction

Traditional systems of medicine have played an important role in addressing the healthcare needs of people since ancient times (Rastogi and Kaphle, 2011; Ansari, 2021). There are several types of traditional healthcare systems in India including ayurveda, siddha, unani, yoga, naturopathy, and homoeopathy. Some emerged in India (i.e., ayurveda, yoga) while others (i.e., unani, homoeopathy, naturopathy) were introduced from outside and subsequently adopted by Indian healthcare practices (Ravishankar and Shukla, 2007; Pandey et al., 2013). Ayurveda is regarded as one of the world's oldest organized systems of medicine with origins commonly traced to around 1500 BCE. Today, ayurveda remains one of the most widely practiced traditional medical systems worldwide (Jaiswal and Williams, 2017; Elahee et al., 2019). Ayurvedic philosophy is founded on a holistic understanding of health in which the human body is viewed as an interconnected system regulated by three fundamental functional principles known as doshas such as Vata (movement and physiological activity), Pitta (digestion and metabolism), and Kapha (structure, stability, and lubrication). According to ayurveda, health is maintained through the equilibrium among these three doshas, whereas disease (vikruti) is considered a consequence of imbalance within one or more of them (Basisht et al., 2014; Steer, 2019).

Within ayurvedic practice substances of animal origin particularly those derived from bovine sources have historically been incorporated into therapeutic and medicinal preparations. Among these, cow urine, referred to as gomutra, occupy a notable place because of their availability, affordability and cultural significance in India (Mohanty et al., 2014). Classical texts such as Sushruta Samhita, Charaka Samhita, Bhaisajya Ratnavali and Arya-Bhishak describe the traditional use of cow urine in managing conditions associated with Hrid Roga (cardiovascular disorders), Udar Roga (digestive disorders), Manas Vyadhi (psychological conditions), and certain dermatological conditions including Kandu (itching), Vicharchika (eczema), and Yauvanpidika (acne vulgaris). Cow urine is also constitutes one of a component of panchagavya, a traditional ayurvedic formulation used for cognition enhancement, antioxidant and immunomodulatory effects (Mandavgane and Kulkarni, 2020; Bajaj et al., 2022).

Recently, cow urine has attracted widespread attention due to the presence of several bioactive constituents and their proposed biological and pharmacological activities (Kumar et al., 2023; Pandit et al., 2024; Katekar et al., 2026). Experimental and exploratory studies have investigated their possible applications in areas such as oxidative stress, diabetes, cancer, fever, osteoarthritis, hypertension and supportive care during the COVID-19 period (Pandit et al., 2025). A number of recent studies have demonstrated that cow urine is nontoxic and has antimicrobial, antiviral, anti-aging, angiogenic, and bone and cartilage regeneration properties (Shewale et al., 2025; Kharat et al., 2025; Saha et al., 2026). However, evidence regarding its clinical efficacy, mechanisms of action, and long-term safety remains limited and requires further validation (Singh et al., 2023).

Therefore, the aim of this review is to provide a comprehensive overview of the traditional and contemporary medicinal uses of cow urine. It also highlights current knowledge gaps and explores future research directions to further validate its role in integrative healthcare.

2. The Concept of Health in Ayurveda

Ayurveda represents a holistic approach to health that incorporates the physical, psychological, and spiritual aspects of human life (Ravishankar and Shukla, 2007). According to this philosophy, health is understood as a state of balance and harmony between the individual and the surrounding environment. This philosophy further considers all living beings as reflections of the universe composed of Pancha Mahabhuta (the five fundamental elements) including Prithvi (Earth), Jal (Water), Agni or Teja (Fire), Vayu (Air), and Akash (Space/Ether). These elements combine to form the three fundamental regulatory forces known as Tridoshas including Vata, Pitta, and Kapha which together govern the physiological and functional processes of the body. Health is achieved by maintaining equilibrium among the Tridoshas, Saptadhatu (seven bodily tissues) and Trimala (metabolic waste products including feces, urine, and sweat (Payyappallimana and Venkatasubramanian, 2016; Guruprasad et al., 2017). Each individual is believed to be born with a unique constitutional profile known as Prakruti which reflects the natural balance of the three doshas (**Fig 1**). Disruption of this balance leads to a condition known as Vikruti which is regarded in Ayurveda as the basis of disease development. Western medicine primarily emphasizes disease-specific pathology and classification whereas Ayurveda views disease as a progressive and interconnected process resulting from systemic imbalance (Kapadia and Dagar, 2022; Porter et al., 2023). However, this constitutional state may be influenced over time by several internal and external factors including diet, lifestyle, environmental exposure, and seasonal changes.

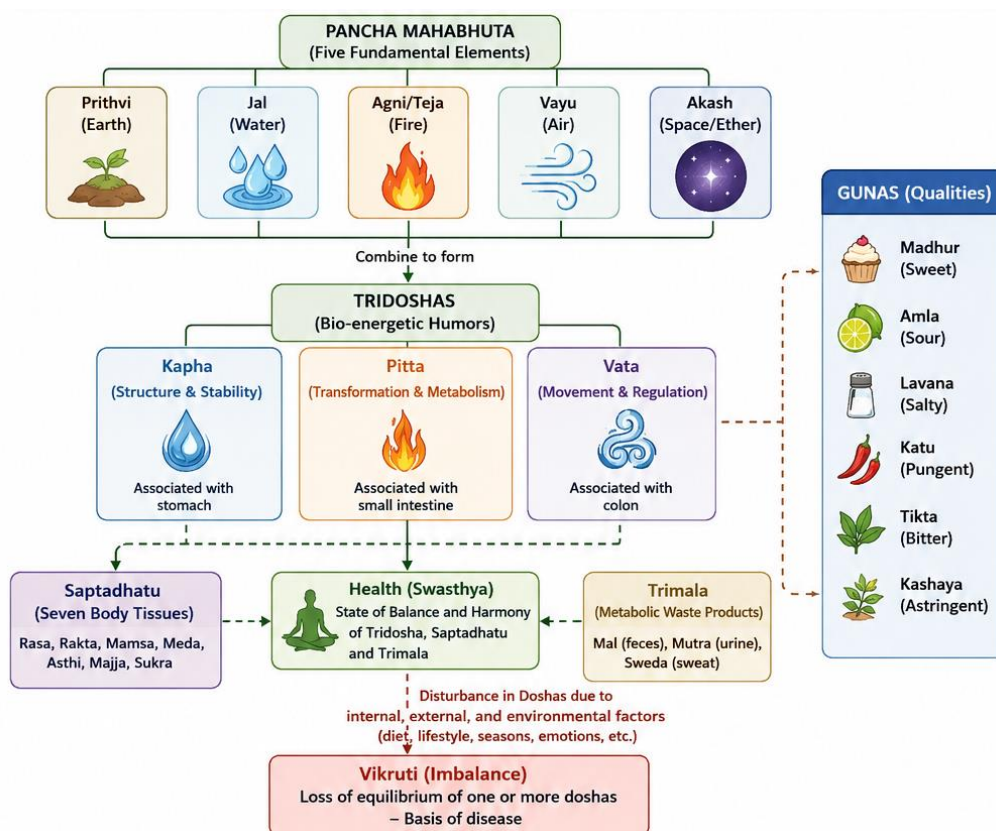


Fig 1. Relationship between the fundamental elements of the human body

3. Cow Urine at a Glance

The cow has traditionally been regarded not only as an animal of agricultural and cultural importance but also as a symbol of holistic well-being encompassing the physical, philosophical and spiritual dimensions of life in India (Raut and Vaidya, 2018). Ancient Vedic and post-Vedic literature contains numerous references emphasising medicinal significance of cow-derived products including dairy products such as milk, butter and yogurt as well as by-products such as dung and urine. These products have been extensively discussed in traditional practices in relation to human nutrition, health promotion and therapeutic applications (Prasad and Kothari, 2022; Chinniah et al., 2024).

Cow urine is a traditional therapeutic substance with diverse medicinal applications in Ayurvedic literature. It is a natural excretory substance that can be obtained throughout the lifespan of cows. On average, a cow may produce more than 13 liters of urine per day (Mandavgane and Kulkarni, 2020). According to Ayurvedic literature, Gomutra has a slightly sweet taste and mildly alkaline (Kshariya) nature. It is further characterized by properties such as Katu rasa (pungent taste), Laghu (lightness), Ushna (hot potency), Tikshna (penetrating nature), and Arooksha (non-drying properties) (Chaudhari et al., 2022; Joshi et al., 2022). From a modern perspective, cow urine is reported to consist predominantly of water (approximately 95%) and urea (approximately 2.5%) while the remaining fraction contains a diverse range of organic and inorganic constituents (Fig. 2).

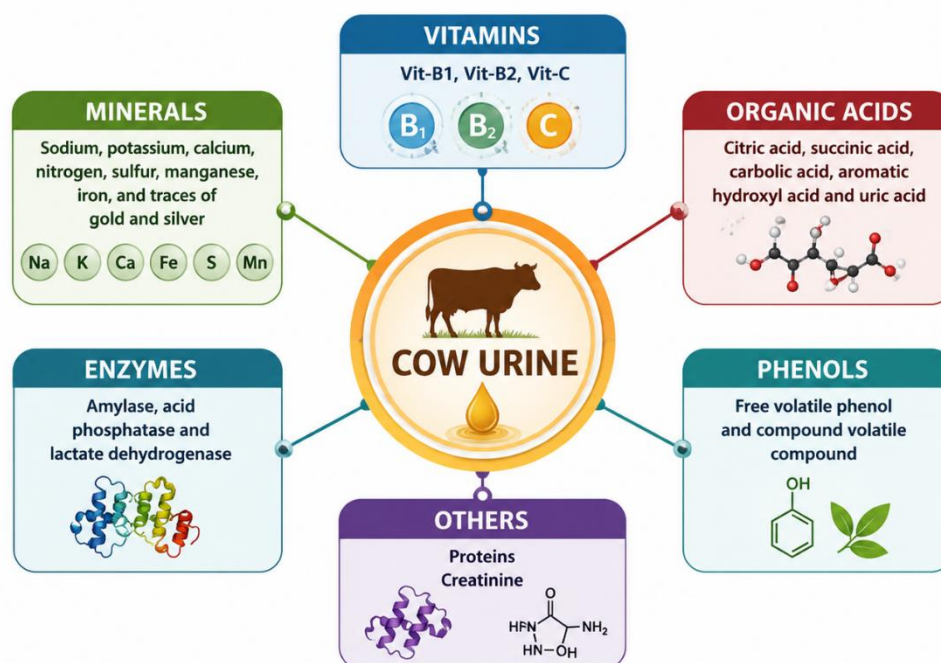


Fig 2. Overview on major bioactive constituents of cow urine

3.1. Intake Forms or Pharmaceutical Dosage Forms of Cow Urine

Cow urine has been broadly described in both the ayurvedic and contemporary literature. Classical ayurvedic texts primarily recommend the use of fresh or crude cow urine in various forms including Pan (oral consumption), Snan (bathing), Nasya (nasal administration) and topical applications such as Lepa or Pradeha (external paste or ointment). With advancements in processing technologies, several modified dosage forms have been developed and discussed in modern literature for therapeutic use (**Fig 3**). These include cow urine distillate (gomutra ark), ghanavati (solid extract formulation) and gomutra powder. Cow urine-derived nanomaterials have emerged as promising biocompatible materials with pharmacological applications (Jarald et al., 2008; Pallawi et al., 2023; Raut et al., 2024). Despite these developments, the common acceptance of cow urine-based formulations remains limited due to formulation stability, strong odor, and unpleasant taste which may affect persistent acceptability and compliance. Therefore, further improvements in processing technologies, formulation strategies and product standardization are needed to enhance the usability and therapeutic applicability of these dosage forms (Khan et al., 2014; Singh et al., 2023).

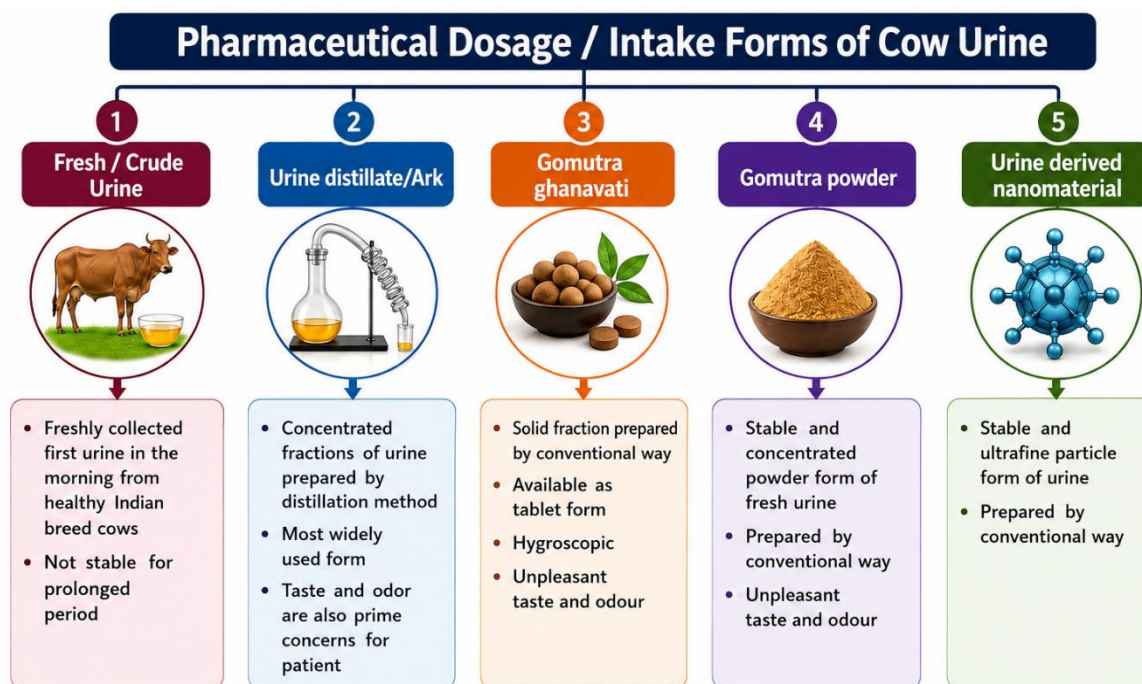


Fig 3. Different intake forms or pharmaceutical dosage forms of cow urine

3.2. Therapeutic significance of cow urine in Ayurveda and contemporary research

One of the earliest references to urine therapy is found in the ancient text Dammar Tantra, where urine-based practices are described in the context of health promotion and disease management. In several Indian Vedic and post-Vedic texts, cow urine has been described as Amrita (nectar of immortality) and is associated with traditional concepts of vitality and well-being (Mahajan et al., 2020). Within Ayurvedic therapeutics, gomutra has been described as an important natural resource because of its year-round availability, low cost, and cultural significance associated with cows in India. Classical Ayurvedic literature suggests that gomutra may assist in restoring the balance of Tridosha (vata, pitta, and kapha) which are considered central regulators of physiological functions in Ayurveda (Meghana et al., 2021). According to Ayurvedic principles, disturbance in Tridosha equilibrium contributes to disease development while restoring Dosha balance supports overall health. These include dosha referred to in Ayurveda as Kamala (jaundice), Jwara (fever), Amavata (arthritis-like disorders), Mukhapaka (oral ulcers), Tamakaswasa (asthma) and certain neurological conditions (Hazarika et al., 2018; Pandit et al., 2023). Certain formulations comprising cow urine have received United States patents (i.e., 6410059 and 6896907) for their antimicrobial, anticancer and bioenhancers properties (Dhama et al., 2008). The use of cow urine either alone or in combination with medicinal herbs for treatment a range of ailment is summarised in **Table 1**.

Table 1. Therapeutic uses of cow urine as per Ayurveda classics (Lad, 2002; Lad 2006; Patel et al., 2021)	
Name of Vikruti (disease)	Mode of application and summary
Gynecological disorders	External and internal uses along with Triphala Rasa (extract of three myrobalans) and Takr (buttermilk)

Kusth (Skin disorders)	As Pan (for drinking), Snan (for bathing) and Pradeh (local application of paste) along with Daruharidra (<i>Berberis aristata</i>)
Manas Vyadhi (Mental disorders)	External uses as Nasya (nasal inhalation) while internal uses prescribed in the form of Ghrit (butter) like the Panchgavya Ghrit
Pandu (Anemia)	Internal uses along with Haritaki (<i>Terminalia chebula</i>) or as Anupan (vehicle) of medicine
UdarRoga (Gastrointestinal disorder)	Internal uses as Pan (drinking) is advised in treatment of Baddhodara (intestinal obstruction), for Niruha (decoction enema) and Anuvasana (fat enema) with medicinal herbs
Vish (Poisoning)	Internal uses prescribed in the form of Ghrit with combination of Nagdanti (<i>Croton oblongifolius</i>), Trivrit (<i>Operculina turpethum</i>), Dravanti (<i>Croton tiglium</i>), Danti (<i>Baliospermum montanum</i>), Snuhipay (<i>Euphorbia neriifolia</i>) and Mahishghrit
Vran (Wound)	External application for wound healing

Recent experimental studies revealed that the bioactive constituents present in cow urine may exhibit antioxidant, antimicrobial, antiviral, and immunomodulatory properties (Tilwani and Dave 2023; Pandit et al., 2024; Deoghare and Pandit, 2026). Their effects on oxidative stress regulation, glucose metabolism, cellular protection mechanisms, and bone and cartilage regeneration have also been reported (Mohanvel et al., 2017; Mahida et al., 2017; Kharat et al., 2025). In addition, use of cow urine as a green reducing and stabilizing agent for the biosynthesis of nanomaterials has emerged as a promising area of research in recent years. Several transition metals and metal oxide nanomaterials including silver, gold, zinc, iron, copper, copper oxide, and bismuth vanadate nanoparticles have been synthesized using cow urine. These nanomaterials have demonstrated promising antibacterial, antioxidant, anticancer, and other biomedical activities in experimental studies (Prasad et al., 2025; Hiremath et al., 2025). The evidence-based therapeutic potential of cow urine and its proposed mechanisms of actions are summarised in **Table 2**.

Table 2. Evidenced based pharmacotherapeutic potential of cow urine and their possible action mechanism (nd: not described)		
Used from of cow urine	Therapeutic properties and possible mechanism	Reference
Fresh urine	Antibacterial activity; nd	Arya et al., 2025
Free fatty acids from urine DMSO fraction	Anticancer activity ; anti-proliferation and pro-cell death	Raj et al., 2023

Fresh urine	Anti-obesity and dyslipidemia; reduced BMI, obesity index, triglycerides, and LDL-C	Sharma et al. 2017
Fresh urine	Neuro and brain protective; Improved levels of acetylcholinesterase (AChE)	Sharma and Chadha, 2016
Fresh urine	Antidiabetic activity; stimulate peripheral use of blood glucose	Jarald et al., 2008
Gomutra Ghana	Antibacterial activity; nd	Raut et al., 2024
Urine-derived cuprous oxide (Cu ₂ O) NPs	Antibacterial activity ; formation of reactive oxygen species	Prosper et al., 2026
Urine-derived silver oxide (Ag ₂ O) NPs	Anticancer activity; nd	Venkatesh et al., 2026
Urine distillate-derived copper (Cu) NPs	Antidiabetic, bactericidal and radical scavenging activity; nd	Angle et al., 2025
Urine derived-zinc oxide, iron oxide and zinc-iron NPs	Anti-inflammatory and anticancer activity; nd	Hiremath et al., 2025
Urine-derived Bismuth vanadate (BiVO ₄) NPs	Anticancer and antioxidant activity; nd	Ghotekar et al., 2024
Urine-derived gold (Au)NPs	antimicrobial and antioxidant activities;nd	Pawar et al., 2022
Urine distillate	Antiviral activity against Chikungunya virus (CHIKV); Inhibition of CHIKV nsP2 protease (nsP2Pro)	Saha et al., 2026
Urine distillate	anti-aging, osteogenic, antioxidant activity; reduced oxidative stress and delayed cellular senescence	Kharat et al., 2025
Urine distillate	Antibacterial activity; inhibiting DNA gyrase and PDBID	Pant et al., 2024
Urine distillate	Immunomodulatory activity ; increased B and T cells proliferation	Ambwani et al. 2018

Urine distillate	Anticancer activity; promote cell apoptosis and DNA repair mechanism	Mohanvel et al., 2017
Urine distillate	Immunomodulatory activity; up-regulated the heterophil, basophil and monocytes proliferation	Tadavi et al. 2017
Urine distillate	Antidiabetic activity; reduce level of elevated blood glucose and serum creatinine	Mahida et al., 2017

4. Conclusions and perspectives

Cow urine has been used as remedy to treat various physiological, gastrointestinal, and dermatological disease in traditional ayurvedic practices. It has been shown to possess antioxidant, antimicrobial, anti-inflammatory, immunomodulatory, antidiabetic and anticancer properties in several experimental studies. Recent advancements in green nanotechnology indicate that it has the potential to be a natural stabilizing and reducing agent in biosynthesis of pharmaceutically important nanomaterials. However, the current evidence is still based on in vitro studies, animal models and only a small number of human clinical studies. The reproducibility of these findings are difficult due to variations in cow breeds, dairy habits, geographic location, and collection methods. This is also the reason many traditional therapeutic claims related to cow urine could not be proven exactly. Future research should emphasize on standardization of cow urine-based formulations, characterization of bioactive constituents, elucidate molecular mechanisms of action and well-designed clinical trials. The incorporation of traditional ayurvedic field knowledge as well as contemporary verdicts may lead to its better utilization within integrative healthcare systems.

5. Conflict of Interest

Authors declare no conflict of interest

6. Acknowledgement

The figure was drawn with the assistance of BioRender.com

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