



The Renal Renaissance: Ayurveda's insight on Nephrology

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Abstract

In the landscape of modern medicine, the field of *nephrology* stands at the forefront of innovation and discovery, propelled by a wave of advancements that have revolutionized the understanding and management of *kidney diseases*. However, amidst the rapid progress of modern science, there exists a profound appreciation for the timeless wisdom encapsulated within ancient healing traditions such as *Ayurveda*. The confluence of these two realms “*modern nephrology* and *traditional Ayurveda*” gives rise to what can aptly be termed as the *Renal Renaissance*, an era marked by the fusion of ancient insights and modern practices, aimed at enhancing kidney health. Urine formation has a major role in human physiology. The concept of “*Mutravaha Srotas*” in Ayurveda refers to the *urinary system*, encompassing the *kidneys, ureters, bladder, and urethra*, along with their associated functions and pathways. In Ayurveda, the kidneys, known as “*Vrikka*,” play a pivotal role in maintaining overall health and vitality. The process of urine formation begins with digestion, wherein food is transformed into nutritive substances (*Ahara Rasa*) and waste products, including urine. While modern medical science views urine as a filtrate of blood plasma, with the kidneys serving as the primary filtration organs. Ayurveda posits that urine is formed from *Ahara Rasa* within the intestines. This concept of *Mutra Nirman* (urine formation) in Ayurveda has been a topic of controversy. By integrating Ayurvedic insights into nephrology, one can adopt a comprehensive approach to kidney care, addressing both the physical and holistic aspects of renal wellness.

Keywords : Nephrology, Ayurveda, Renal Renaissance, *Mutravaha srotas*, *Vrikka*.

INTRODUCTION

In the ever-evolving landscape of healthcare, the integration of ancient wisdom with modern science has become increasingly prominent. Among the various medical specialties, *Nephrology*, a field dedicated to the study and treatment of kidney-related disorders has witnessed a resurgence of interest in the insights offered by Ayurveda.

In Ayurveda, the kidneys, known as “*Vrikka*,” play a pivotal role in maintaining overall health and vitality. In the context of nephrology, imbalances in the doshas are believed to contribute to the development of kidney disorders. For example, excess *Pitta* dosha may lead to inflammation and heat-related conditions such as *nephritis*, while *Vata* imbalance can manifest as dryness and impaired kidney function, while *Kapha* imbalance may lead to renal abscess.

METHODS: References related to *Ayurvedic and modern aspect of Nephrology* were searched and relevant literature was reviewed from *Samhitas*, modern books and journal articles. Available commentaries of present era are also reviewed.

LITERATURE REVIEW

Despite detailed description of urinary system’s anatomy and physiology found throughout different parts of the *Samhitas*, there exists a disconnect between these depictions.

According to *Acharya Charaka* (Cha.Vi.5/7), moolasthan of *Mutravaha srotas* are *Basti* (urinary bladder) and *Vankshana*(groin or loin/ureter).

According to *Acharya Sushruta* (Su.Sha.9/12) , moolasthan of *Mutravaha srotas* are *Basti* (urinary bladder) and *Medhra*(penis/urethra).

Through an in-depth analysis of the “*mutravaha srotas*,” it becomes apparent that the kidneys serve as the foundational element(*moola*) of this system, but the term “*vrikka*” is used to describe the kidneys, often within the context of the “*medovaha srotas*.” While this differs from modern anatomical terminology, the essence remains same ,the kidneys are central to the urinary system's functioning.

Components of Urinary System:

- 2 Kidneys
- 2 Ureters
- Urinary Bladder
- Urethra

Based on the principles of Kriya Sharir (Ayurvedic physiology) :

The urinary system's functioning encompasses the entire process of urine formation. This begins with the digestion of food and its absorption, particularly the absorption of water, which serves as the precursor of urine, from the *Pakwashaya* (colon). Subsequently, there is a continuous microfiltration of urine from the blood through the *vrikka* (Kidney), followed by its collection in the *Basti* (urinary bladder) through the *Mutravahi Dwe* (ureters). Finally, the process concludes with micturition, or the expulsion of urine, through the *Mutra-Praseka* (urethra).

KIDNEY(VRIKKA) :

	Ayurvedic view	Modern view
Utpatti	Matruja bhava (Cha.Sha 3/6) " Vrikka are formed by Prasada bhaga of Rakta and Meda dhatu" (Su.Sha. 4/30)	Secretory Part -Nephrogenic cord (Metanephron). Metanephron forms- Metanephric blastema. Collecting Part - Ureteric bud arise from the lower part of Mesonephric duct. Nutrition - Dorsal Aorta
Sankhya	2	2
Situation	Vama & Dakshina parswa(one is situated in left lateral quadrum and other one is in right lateral quadrum.	Kidney is a Retroperitoneal organ. Situated on the posterior abdominal wall ,one on each side of the vertebral column between T12 to L3 vertebrae. Coverings : 1. Fibrous capsule 2. Perirenal fat 3. Renal fascia 4. Pararenal fat.
Relation with srotas	<i>Medovaha srotas</i> Moola (<i>Vrikka,vapavahana</i> - Charaka) (<i>Kati, vrikka</i> – Sushruta)	Fat
Shape	<i>Kukshi golaka</i> (round nodular shape)	Bean shaped
Upayojit sharira	<i>Vrikka Puti</i>	Renal cyst
	<i>Vrikkashmari</i>	Renal calculus
	<i>Vrikkarbuda</i>	Renal tumour
	<i>Vrikka sotha</i>	Nephritis
	<i>Vrikka vidradhi</i>	Renal abscess
Weight	-	Female-135g Male-150g
Diameter	-	11cmx6cmx3cm

Functions :

Vrikko pushtikaro proktah jatharastha medasah .(Sha.Sa.5/84)

The kidneys nourish and support the meda dhatu (fat tissue) located in the abdomen

According to modern point of view :

- **Filtration:** Removes waste and excess substances from blood.
- **Fluid Balance:** Adjusts urine production to maintain hydration.
- **Blood Pressure Regulation:** Controls blood volume and vascular resistance.
- **Electrolyte Balance:** Regulates sodium, potassium, and calcium levels.
- **Acid-Base Balance:** Excretes hydrogen ions and reabsorbs bicarbonate ions.
- **Erythropoiesis Regulation:** Produces erythropoietin to stimulate red blood cell production.
- **Vitamin D Activation:** Converts inactive vitamin D to active form for calcium absorption.
- **Waste Excretion:** Eliminates metabolic waste, drugs, and toxins.
- **Glucose Regulation:** Plays a role in glucose production during fasting.
- **Water Reabsorption:** Reabsorbs water to maintain hydration levels.

URETER(GAVINI) :

Gavini, known as the ureters, are a pair of structures situated on either sides of the Basti (urinary bladder). They serve to transport Mutra (urine) from the Vrikka (kidneys) to the Basti, as described in the Atharvaveda.

Modern point of view

Anatomy: The ureters are muscular tubes that connect each kidney to the bladder. They transport urine from the renal pelvis to the bladder for storage.

Physiology: Peristaltic contractions of the ureter walls help propel urine downward toward the bladder. The ureters also contain valves that prevent urine from flowing backward toward the kidneys.

URINARY BLADDER(BASTI) :

Basti, or the urinary bladder, is interpreted as an organ that stores urine.

Embryological Development: Derived from maternal contribution during fetal life (Matrujabhava), its formation involves the essence of Rakta and Kapha, aided by Pitta, and the involvement of Vata.

Position:

Basti has been included under the Koshtangas and Ashayas by all the Acharyas.

Charaka - Basti is surrounded by Sthoolaguda, Mushka, Sevani, Shukravaha Nadi and Mutravaha Nadi.

Sushruta – Basti is surrounded by Nabhi, Pristha, Kati, Mushka, Guda, Vankshana and Shepha.

Bhavamishra and Sharangadhara - Mentioned that Basti is located below the Pakwashaya.

Amarakoshakara - Mentioned it below the Nabhi.

Vagbhata - The Sthana of Basti is in Kati Pradesha. Positioned below the Pakwashaya, surrounded by various anatomical structures such as Sthoolaguda, Mushka, Sevani, Shukravaha Nadi, Nabhi, Pristha, Kati, Mushka, Guda, Vankshana, and Shepha.

Structure: Alabu shaped with veins (Sira) and ligaments (Snayu) on all sides, Basti is described as thin-walled (Tanutwaka) with a single downward-directed outlet. It shares an inner relationship with Basti Sira, Paurusha Granthi, Vrishana, and Guda in the pelvic cavity.

Modern point of view

Anatomy: The bladder is a hollow, muscular organ located in the pelvis. It serves as a reservoir for storing urine until it is expelled from the body during urination.

Physiology: The bladder can expand to accommodate increasing volumes of urine. Sensory nerves in the bladder wall signal the brain when the bladder is full, triggering the urge to urinate. The detrusor muscle contracts to facilitate bladder emptying during urination.

URETHRA(MUTRAPRASEKA):

Mutrapraseka, identified as one of the eight vital organs requiring protection during surgical procedures for Ashmari (urinary stones), is crucial to safeguard against complications. As per Dalhana, it is situated at the outlet of the Basti (urinary bladder), where urine exits. In males, it measures four Angula in length, while in females, it measures two Angula. However, in female children, its length may be considerably shorter. Functionally, it carries both urine (Mutra) and semen (Shukra) in males, whereas in females, it exclusively transports urine.

Modern point of view

Anatomy: The urethra is a tube that carries urine from the bladder to the exterior of the body during urination.

Physiology: In males, the urethra serves a dual function, also acting as the passage for semen during ejaculation. In females, the urethra is shorter and solely serves as a urinary passage. The external urethral sphincter, composed of skeletal muscle, helps control the flow of urine out of the body.

Mutra Nirmana Prakriya : (According to Ayurveda)

The Mutra Nirmana Prakriya, as outlined by Sushruta, revolves around the conversion of consumed food into Saara (Prasada) and Kitta portions after digestion, facilitated by Samana Vayu. While the Sara part is utilized as nutrition, the Kitta portion, containing nutrients and precursors of urine and faeces, undergoes further processing. Within Kitta, the Sandra part transforms into faeces, while the Drava part becomes urine. Sushruta identifies the Pakwashaya and Amashaya as the primary organs for urine production, from where it travels to the Basti, where it accumulates through channels bringing urine from the area between Amashaya and Pakwashaya. This process is likened to rivers flowing into the sea, with urine-bearing channels delivering saturated urine to the bladder. Another analogy used by Sushruta is that of a fresh pitcher submerged in water, where the minute pores in its walls fill with water, mirroring how the Basti is filled with urine through these minute channels.

Process of urine formation : (According to modern point of view)

The mechanism of urine formation involves three main processes:

Filtration: Blood enters the kidneys through the renal arteries, where it passes through a network of tiny blood vessels called glomeruli. The high pressure in the glomeruli forces small molecules like water, electrolytes, glucose, and waste products to pass through the walls of the glomerular capillaries into the Bowman's capsule, forming a filtrate called primary urine.

Reabsorption: As the filtrate moves through the renal tubules (proximal convoluted tubule, loop of Henle, distal convoluted tubule, and collecting duct), essential substances such as water, glucose, amino acids, and ions are reabsorbed back into the bloodstream. This process occurs selectively based on the body's needs, maintaining homeostasis. Four different segments have each unique absorptive properties.

- (i) *Proximal convoluted tubule* – reabsorbs all the glucose and amino acids as well as 65% of sodium, potassium, calcium, bicarbonates, chlorides, phosphate, urea, uric acid and water.
- (ii) *Descending limb of Loop of henle* – reabsorb water. Ascending limb of Loop of henle – reabsorb sodium, potassium and chlorides
- (iii) *Distal convoluted tubule* – reabsorb sodium, calcium, bicarbonate and water.
- (iv) *Collecting tubule* – reabsorb active sodium and calcium

Secretion: Some substances, such as hydrogen ions, potassium ions, and certain drugs, are actively transported from the blood into the renal tubules to be eliminated from the body. This process helps regulate the body's pH balance and remove additional waste products.

The remaining fluid, now concentrated urine, moves through the collecting ducts into the renal pelvis and eventually into the ureters for excretion from the body. This intricate process ensures that waste products are removed from the bloodstream while essential substances are retained, maintaining the body's internal balance.

Micturition (Urination):

Physiology: Micturition is the process of emptying the bladder of urine. When the bladder reaches a certain volume, sensory receptors in the bladder wall send signals to the brain, initiating the urge to urinate. Voluntary control of micturition involves relaxation of the external urethral sphincter and contraction of the detrusor muscle to expel urine from the bladder.

Integration of Ayurveda with Nephrology :

According to Ayurveda	According to Modern
<p>In Ayurveda, <i>Vrikka roga</i> refers to various kidney disorders or diseases. Here are some types of <i>Vrikka roga</i> along with brief descriptions:</p> <p>Mutrakrichra (Dysuria): Mutrakrichra is characterized by difficulty or pain during urination. It can result from various causes, including urinary tract infections, kidney stones, or inflammation of the urinary tract.</p> <p>Ashmari (Kidney Stones): Ashmari is the formation of stones (calculi) in the kidneys or urinary tract. These stones can vary in size and composition and may cause symptoms such as severe flank pain, blood in the urine, and urinary obstruction.</p> <p>Prameha (Urinary Disorders): Prameha encompasses a group of urinary disorders characterized by excessive urination or abnormal urine composition. It includes conditions such as diabetes mellitus, diabetes insipidus, and other metabolic disorders affecting the kidneys.</p> <p>Pandu (Anaemia): Pandu refers to anaemia, a condition characterized by a deficiency of red blood cells or haemoglobin in the blood. Chronic kidney diseases can lead to anaemia due to decreased production of erythropoietin, a hormone produced by the kidneys that stimulates red blood cell production.</p> <p>Mutraghata (Urinary Obstruction): Mutraghata is the obstruction of urine flow, which can occur due to various factors such as kidney stones, tumors, or structural abnormalities in the urinary tract. It can lead to symptoms such as pain, difficulty urinating, and urinary retention.</p> <p>Vrikka Shotha (Kidney Inflammation): Vrikka Shotha refers to inflammation of the kidneys, which can result from infections, autoimmune disorders, or other inflammatory conditions. It may present with symptoms such as fever, flank pain, and urinary changes.</p> <p>Arsha (Haemorrhoids): While not directly related to kidney disorders, Arsha, or haemorrhoids, can sometimes be associated with <i>Vrikka roga</i> due to shared factors such as constipation and improper diet, which can affect kidney health indirectly.</p>	<p>Nephrology is the branch of medicine focused on the study, diagnosis, and treatment of kidney diseases and disorders, which includes:</p> <p>Chronic kidney disease (CKD): A progressive condition characterized by the gradual loss of kidney function over time. CKD can result from various causes, such as diabetes, hypertension, autoimmune diseases, and genetic disorders.</p> <p>Acute kidney injury (AKI): A sudden and often reversible decline in kidney function, usually caused by factors such as dehydration, severe infections, medications, or trauma.</p> <p>Glomerular diseases: Conditions that affect the glomeruli, the tiny filters in the kidneys responsible for removing waste and excess fluids from the blood. Examples include glomerulonephritis and nephrotic syndrome.</p> <p>Kidney stones: Hard mineral deposits that form in the kidneys and can cause severe pain and urinary tract obstruction.</p> <p>Polycystic kidney disease (PKD): A genetic disorder characterized by the formation of fluid-filled cysts in the kidneys, which can lead to kidney failure over time.</p> <p>Urinary tract infections (UTIs): Infections of the urinary system, including the kidneys, bladder, ureters, and urethra.</p>
<p>Management :</p> <p>Dietary Modifications: Ayurveda emphasizes the importance of dietary choices in promoting kidney health. Recommendations may include reducing the</p>	<p>Management :</p> <p>1.Lifestyle Modifications:</p> <p>Healthy Diet: A balanced diet low in sodium, phosphorus, and potassium and adequate in protein is</p>

intake of salty, spicy, and processed foods, as well as limiting the consumption of protein-rich foods that can strain the kidneys. Instead, a diet rich in fresh fruits, vegetables, whole grains, and legumes is encouraged to support overall health and kidney function.

Herbal Remedies: Ayurvedic herbs are commonly used to support kidney health and address various kidney disorders. Some commonly prescribed herbs for Vrikka roga include Punarnava (*Boerhavia diffusa*), Gokshura (*Tribulus terrestris*), Varuna (*Crataeva nurvala*), Shilajit, Mutrasangrahaniya-Mutravirechaniya-Mutravirajaniya dravyas,. These herbs are believed to have diuretic, anti-inflammatory, and nephroprotective properties that can help in managing kidney diseases.

Lifestyle Modifications: Lifestyle factors such as stress, lack of physical activity, and inadequate hydration can impact kidney health. Ayurveda recommends incorporating stress-reduction techniques such as yoga, meditation, and deep breathing exercises into daily routines to promote overall well-being. Regular physical activity and adequate hydration are also important for maintaining kidney function.

Panchakarma Therapy: Panchakarma, a detoxification therapy in Ayurveda, may be recommended for individuals with chronic kidney diseases or those experiencing severe symptoms. Panchakarma procedures such as Virechana (therapeutic purgation) and Basti (medicated enema) help in eliminating toxins from the body, reducing inflammation, and restoring balance to the doshas.

Regular Follow-up and Monitoring: Ayurvedic treatment for Vrikka roga typically involves regular follow-up consultations with an Ayurvedic practitioner to assess progress, adjust treatment plans as needed, and monitor kidney function through diagnostic tests such as urine analysis and kidney function tests.

recommended. Dietary restrictions may vary based on the stage of CKD and individual requirements.

Fluid Intake: Monitoring and controlling fluid intake may be necessary, especially in advanced CKD stages to prevent fluid overload and hypertension.

Weight Management.

Smoking Cessation.

2. Blood Pressure Control:

Medications: Angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) are commonly prescribed to lower blood pressure and reduce proteinuria, slowing the progression of CKD.

Regular Monitoring: Blood pressure should be monitored regularly, with the goal of achieving target levels (<130/80 mmHg) to protect kidney function and reduce cardiovascular risk.

3. Management of Complications:

Anaemia Treatment: Erythropoiesis-stimulating agents (ESAs) or iron supplements may be prescribed to manage anaemia associated with CKD and improve quality of life.

Bone Health: Calcium and vitamin D supplements, phosphate binders, and medications to control parathyroid hormone levels may be prescribed to prevent or manage mineral and bone disorders.

Electrolyte Balance: Medications and dietary modifications may be recommended to manage imbalances in potassium, calcium, phosphorus, and acid-base status.

4. Medication Review and Adjustment:

Renal Dosing: Medications should be reviewed and adjusted based on renal function to prevent toxicity and adverse effects.

Avoid Nephrotoxic Agents: Certain medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs) and nephrotoxic antibiotics, should be avoided or used with caution in patients with CKD.

5. Dialysis and Kidney Transplant:

Dialysis: Haemodialysis or peritoneal dialysis may be initiated in advanced CKD stages to remove waste products and excess fluids from the body when kidney function is severely impaired.

Kidney Transplant: For eligible patients with end-stage kidney disease, kidney transplantation offers the potential for improved quality of life and long-term survival compared to dialysis.

6. Monitoring and Follow-Up:

Regular Check-ups: Monitoring kidney function, blood pressure, electrolytes, and other parameters through regular check-ups with healthcare providers is essential for managing CKD and adjusting treatment as needed.

Patient Education: Educating patients about their condition, treatment options, lifestyle modifications, and self-management strategies empowers them to actively participate in their care and optimize outcomes.

Conclusion:

Ayurvedic insights are revitalizing nephrology in the renal renaissance offering a holistic approach to kidney health rooted in ancient wisdom. By embracing Ayurvedic principles of balance, personalized care, and holistic wellness, nephrology stands to benefit from the rich heritage of traditional healing practices. Through continued collaboration and research, the integration of Ayurveda into nephrology promises to enhance the holistic management of kidney disorders and promote optimal health for all.

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