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## Review Article

### AYURVEDIC REVIEW OF ANATOMY, PHYSIOLOGY AND PATHOLOGY OF URINARY SYSTEM WITH SPECIAL REFERENCE TO MOOTRA VAHA SROTAS

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#### ABSTRACT

Urinary system of human body is explained in various *ayurveda* text books. Urine formation has a major role in human physiology. Despite the no availability of microscope, vision of *apta jana* (eminent scholars) of *ayurveda* is so clear, the detail of urinary system in their text is highly appreciable. *Mootra nirman* (urine formation), *brikka sanrachna* (anatomy of urinary system) and *mutra roga* (urinary disorders) are explained in detail. Knowledge of *ayurveda* in this aspect not only provide the better understanding about the urinary system but also open the new door in management of various incurable renal diseases like renal failure, nephropathy, urolithiasis etc.

**Key Words:** *Mutravaha Srotas, Mutrakricchra, Mutraghata, Mutrashmari, Brikka, Basti.*

#### INTRODUCTION

The *Ayurvedic* approach to urinary system is highly logical, conceptual and scientific. The pathology, clinical manifestations and restorative options in renal physiology are very well interconnected with fluid, blood and digestive system. The urinary physiology described in *Ayurveda* does not only describe the differential approach toward nephrology and urology, it also shows a very close intermingled and integrated approach in dealing with etio-pathogenesis. The syndromic conditions and their pathological explanations described in this framework over three thousand years ago in *Ayurvedic* classics show an outstanding clinical acumen of ancient physicians.

#### AIM

The aim of this study is to present a compilation and collection in order to develop the overall understanding of urinary system, its functional anatomy and patho-physiology in the light of *ayurveda*.

#### REVIEW OF LITERATURE

##### FUNCTIONAL ANATOMY- *Rachana Sharir*

In the context of 13 different types of micro-channels or *srotasa* of the body, *Ayurveda* describes the *Mutravaha Srotas* as the most fundamental element of urinary tract. As stated by *Sushrut*, *mootravaha srotas* are the paired structures and their *moola are Basti* and *Medhra* whereas *Charak* has mentioned *Basti* and *Vankshana* as their *moola (root of origin)*. *Vagabhatt* supported *Charak* in this regard. According to *Charak* abnormalities of these *srotas* are responsible for voiding too much urine, abnormal composition of urine and occasional or frequent passing of thick urine associated with pain. In the texts, description of the following anatomical structures is given in relation to urinary system.

**1). Brikka-** The two kidneys are described as '*Pratyanga*' and '*Koshthanga*', which are considered as the *moola* of fatty channels. Embryologically, *Brikkas* takes their origin from the chief proportion of blood and fat<sup>1</sup>. Kidneys are also responsible for the nutrition of abdominal fatty tissues<sup>2</sup>.

**2). Mutra Vaha Srotas-** The following structures are considered as the main working unit in the renal system.

**A. Mutravaha Srotansi** – These are the tabulated channels of kidney which have a clay pot like globular structure on their most proximal end. The process of *nisyandana* or filtration takes place here similar to as the clay pot mechanism explained in *Ayurveda*<sup>3</sup>.

**B. Mutra Vahi Dwe** i.e., two major hollow tubes or channels of urinary transport comparing the two ureters to flow the urine from both the kidneys to urinary bladder.

**C. Mutra Srota** i.e., the single main excretory tract i.e. urethra for exteriorization of urine.

All these structures have their close affinity to maintain the excretory system of body. The very strong relation of each and every unit, from micro to macro channels, enables the body to excrete harmful substances in the form of urine. *Srotas* is the name of the channels of all sizes which are solely responsible for smooth flow of various biological substances in our body to perform transportation and proper functioning.

The comparison of pores of clay pot with channels or *srotasa* and shape of clay pot with Bowman's capsule present the ancient analogy to understand the function and relation of whole urinary system in a very easy pattern is highly remarkable. The *Srotas* system is responsible for formation, circulation, excretion and transportation of biological fluids, nutrients, metabolites, bodily wastes and also medicaments whenever used.

##### 3) Mootra vaha nadi

As stated by *Sushrut*, *mootravaha nidi* are situated in between the *amashaya*, *pakwashaya* and *basti*. These *nadis* have thousands of minute openings which are very small to visualize.

There function is *mootra nisyandana* (urine filtration), continuously whether in state of awakening or sleep, also drain the urine into *basti* and keep it moist or filled with urine in the same manner as river drain water into ocean<sup>3</sup>.

#### 4) Mootra vaha Dhamani

*Dhamanis* are basically of three types, depending upon the direction of their course. One type is *adhogami dhamani*, which are ten in the numbers. Each variant again sub-divides into three in between *amashaya* and *pakwashaya*, thus total thirty in the number. *Adhogami dhamanis* transport *vata, mootra, purish, shukra, artava* etc, downward the pelvic cavity. Two *dhamanis* which run toward *mootra basti* are termed as *mootravaha dhamani*. The function of *mootravaha dhamani* is said to be *dharana* and *yapana* of *mootra* and *basti*<sup>4</sup>.

#### 5) Mootra vahini sira

The description of *mootra vahini sira* is available in *Ashtanga Hridaya*, where these are regarded as minute channels carrying the *mootra* to *basti*. These *mootra vahini sira* open in the lateral sides of *basti* and fill the *basti* with *mootra* continuously by the process of *nisyandana*. *Sharangdhar* has emphasized that these *mootra vahini sira* carry aqueous part of *mala drava* of digested food to *basti*<sup>5</sup>.

**6) Basti** – *Basti* is portrayed as one of the *Ashaya*, called '*mootrashaya*'. Its description is widely available in ayurveda. It is mainly elaborated in the context of *dosha-dushya, marma, panch karma, stri roga* etc. This is said to be the organ of vital importance. *Basti* is one among of the three *marma* and considered as *sadyo pranahara marma*. That is why the term '*Pranayata*' is given to bladder by *Sushruta*. It is said to be a major seat of more or less all urinary diseases described in Ayurveda. The urinary bladder is thin walled, *alabu* shape (gourd-shaped) urinary reservoir located in the pelvis. The main function of *Basti* is to store the formed urine. *Maladhara* is another term for *Basti*<sup>6</sup>. At some places the word, *Basti* is used also to indicate the entire urinary tract; kidney-ureter-bladder-urethra. The upper part of urinary bladder i.e. the fundus of bladder is termed as *Basti-Shirsa* and is sometimes counted separately because of its distinct structure and function than the lower part of the urinary bladder. Two muscles are present in *basti-shirsha*<sup>7</sup>.

**Sthana-** *Basti* is considered as a *Koshthang*. According to *Charak*, *basti* is situated between the *sthoor-gud* (rectum), *mushka* (scrotum), *seevani* (perineal raphe) and *shukravaha nadi*. *Sushrut* explained the situation of *basti* in *gudasthi vivara* (pelvic cavity) and is surrounded by different structures like *nabhi, prishtha, kati, mushka, guda, vankshana, shepha*. *Sushrut* referred *basti* as a thin membranous organ covered with the network of *sira* and *snayu* having single opening which is directed downwards<sup>6</sup>.

**7) Mutra-Praseka or Mutra-Srota** signifies the urethra, mainly its penile part.

**8) Asthila** is the glandular structure found in male, around the bladder neck comparing the Prostate. The term '*Paurushah*' is given by *Sushrut* in the description of urinary tract anatomy. *Gananath Sen* says that *Paurusha* is the specific gland located at *bastimoola*.

#### FORMATION OF URINE –Kriya Sharir

Ayurvedic physiology encompasses the phenomena of urine formation right from the process of digestion of food and its absorption, especially absorption of water (precursor of urine) from the *Pakwashaya* i.e. the Colon, up to the constant micro filtration of urine from blood through the *Mutravaha Srotas* i.e. Nephrons, leading further down to its collection in *Basti* i.e. urinary bladder through the *Mutravahi Dwe* i.e. the two ureters and micturition through *Mutra- Praseka* i.e. urethra<sup>5</sup>.

Presumably *Ayurvedic* physiology presupposes that the process begins right from the gut and blood circulation because unless the water i.e. the *Udak* absorbed from the large gut and the metabolite wastes yielded by the circulating blood reach the filtering *Srotas* system, the urine cannot form.

Hence the kidney as urine forming organ is in a continuum with the precursor structures viz. GIT and CVS. As we now know, the kidney is the most vascular organ of the body and it works as filter for the blood. Thus the *Ayurvedic* physiology depicts three phases of urine formation namely;-

- 1) *Udak* i.e. water or precursor of urine.
- 2) *Kleda* i.e. the excreted bodily wastes.
- 3) *Mutra* i.e. the fully formed urine located in *Basti* (bladder).

This phenomenon refers to the fact that when the food is digested the digested material along with the ingested water (*Udak*) trickle down to the lower gut, gets absorbed in circulation gets loaded with metabolic wastes (*Kleda*), passes to the *Mutravaha Srotansi* i.e. Nephrons in the *Basti* (kidney) and further after filtration (*Nisyandana*) the outcome (*Mutra* / urine) gets collected in the *Basti* or the urinary bladder for final micturition.

Urinary micro-channels present in *Pakwashaya*, continuously fill the urinary bladder with urine, similar to the nonstop filling of sea with many small rivers. Each channel has thousands of microscopic openings. Process of filtration of toxic substances in nephrons is similar to the seeping of water from the pores of clay pot. This process of urine formation undergoes day and night continuously<sup>3</sup>.

#### PATHOLOGY –Samprapti

The urinary disorders are solely pathological variant of *srotas* dysfunction and fractional disturbances of *Dosha* and *Dushya*. Common causes of deformity of urinary channels are drinking water, eating food and indulge in coitus, while there is urge of maturation<sup>8</sup>. Disorders of urinary system lead to the signs like excessive urination, increased frequency of micturition, deformed urine, scanty, viscous and frequent urination with pain<sup>9</sup>.

The detailed classification of urinary dysfunctions in texts of *ayurveda* includes 20 syndromes or diseases namely, 8 *Mutrakricchras* i.e. dysureas and 13 kinds of *Mutraghatas* i.e. suppressions and retentions of urine. *Vagbhatt* also includes 20 types of *Prameha* or Diabetic conditions in the province of *Mutraroga* or urinary diseases. These 40 quantifiable variants form the clinical pathology system in *Ayurveda*. These clinical conditions are categorized below:-

1. *Mutra-ati-Pravrittija Mutraroga* or Polyureas: 20 types of *Prameha* or Diabetes
2. *Mutra-a-pravrittija Mutraroga* or Dysureas, Obstructive uropathies, Urolithiasis, Oligoureas, Anureas.

The different clinical entities described under different categories in Ayurveda are procured below with nearest modern correlates which exhibit a high degree of clinical association.

### 1). *Mutrakricchra* or *Dysurias* (8 types)

1. *Vatika Mutrakricchra* i.e. Neurogenic or traumatic dysurea or acute sterile urinary colic.
2. *Paittika Mutrakricchra* i.e. Acute Urinary Tract Infection
3. *Kaphaja Mutrakricchra* i.e. Sub-acute Urinary tract infection.
4. *Sannipataja Mutrakricchra* i.e. Acute or chronic Urinary tract infection.
5. *Abhighataja Mutrakricchra* i.e. Traumatic or Surgical Dysureas.
6. *Sakritaja Mutrakricchra* i.e. Constipational Dysurea.
7. *Ashmarija Mutrakricchra* i.e. Calculus Dysurea.
8. *Shukraja Mutrakricchra* i.e. Dysurea due to seminal stagnation.

2) *Ashmari* or *Urolithiasis* (4 types) -: On the basis of clinical features, analysis of chemical and morphological properties of stones and variation in the nature of curability of the condition, the *Ashmaris* are grouped into four kinds, simulating as below:

1. *Vataja* i.e. uric acid stones.
2. *Pittaja* i.e. calcium oxalate, uric acid and cystine stones.
3. *Kaphaja* i.e. Calcium phosphate stones.
4. *Shukraja* i.e. seminal stagnation also contributes in formation of urinary stones.

### 3) *Mutraghata* i.e. Suppression and Retention of urine (13 types)

#### (A) Retention of Urine

1. *Vutakundalika* i.e. Neurogenic bladder<sup>10</sup>.
2. *Vatavasti* similar to the above.
3. *Mutrotsanga* i.e. Stricture of urethra.
4. *Mutrājathara* or distended urinary bladder.
5. *Mutratita* or incontinence of urine.
6. *Vastikundala* i.e. Atonia of urinary bladder.
7. *Asthila* i.e. enlarged Prostate.
8. *Mutra-granthi* i.e. internal urinary bladder neck obstruction.
9. *Usna-vata* i.e. Pyogenic cysto-urethritis.
10. *Mutra-Sukra* i.e. seminal stagnation.
11. *Vid-vighata* simulates severe constipation and rectovesical fistula.

#### (B) Suppression of Urine

12. *Mutra sada* i.e. Oliguric Renal Failure.
13. *Mutra kshaya* i.e. Anuric Renal Failure.

### 4) *Miscellaneous*

1. *Tuni*
2. *Pratituni*
3. *Mutraavritta vata*
4. *Pratyashthila*
5. *Basti shoola*
6. *Mutra udavarta*
7. *Mutra Viddha*
8. *Parivartika*
9. *Niruddha Prakash*

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4. Ashtang Hridaya – Chikitsa sthana chapter 11
5. Madhav Nidana – Mootraghata nidana

### Treatment- *chikitsa*

1. *Snehana-swedana* followed by *snigdha virechana* in case of *mutraghata*.
2. *Asthapana basti*, *anuvasana basti* and *uttar basti* are helpful.
3. *Nidana parivarjana*.
4. *Vatanulomana*, *udavarta hara* and *mutrala* medicines.
5. In *vataj mutraghata*, oleation of *bala taila* and *narayana taila*, *pinda sweda* below the umbilical region and tub bath (*avgahana*) in luke warm decoction of *vatahara aushadhi*.
6. In *pittaja mutraghata*, cold *pittahara* decoction tub bath (*avgahana*), application of cold substances on umbilical region is recommended.
7. In *kaphaja mutraghata*, *Vaman karma* and *swedana* is good. Use of *tikshna*, *ushna* and *katu* food is also helpful.
8. Powder or decoction of *mutravirechaniya*, *mutrashodhaniya* and *mutraviranjaniya* is recommended in all types of *mutraghata*.
9. *Varunadi kwath*, *trinapanchmula kwath* or *punarnavashataka kwath* is used
10. *Shatavaryadi yoga* (*Yog ratnakar*), *Virtarvadi kwath*, *ushnavatari churna* is helpful.
11. *Ushirasawa*, *chandanasawa*, *sariwadyasava* is also given.
12. *Gokshuradi guggulu*, *Chandra prabha vati*, *gokshuradyavaleha*, *shiva gutika*, *Chandra kala rasa*, *tarakeshwar rasa*, *varunadi loha*, *vrihada vangeshwara rasa*, *swarna vanga* etc., are given in *mutraghata*.

### DISCUSSION AND CONCLUSION

In few words, it can be summarized that urinary diseases, which are considered as a morbid condition, are treatable with *ayurveda*. Our predecessors not only had a good knowledge about these diseases, but also they were aware of its clinical manifestations, pathogenesis and management modalities. The detailed anatomical and physiological vision of *ayurveda* in this regard is important, without which the better understanding about the treatment part can't be develop. The huge knowledge of urinary medicines and surgical procedures, present in *Ayurveda* can definitely bring out a revolutionary change in modern discipline of medical science.

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