

ANATOMICAL AND PHYSIOLOGICAL STUDY OF *MOOTRAVAHA SROTAS*: A
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ABSTRACT

The *Srotas* or channels in the body act like paths or transporting blood and sensory information, absorbing nutrients and expelling waste products from the body. In our *Ayurvedic* classics many *Acharyas* mentioned many *Srotas* like *Pranvaha*, *Raktavaha*, *Udakvaha*, *Mansvaha*, *Medovaha*, *Anavaha*, *Asthivaha*, *Majjavaha*, *Shukravaha*, etc. In this row *Mootravaha srotas* is one of the most important and functional *Srotas*. *Mootravaha srotas* concerned with *Utpatti*, *Visarjana* of *Mootra* and maintaining the *Kleadata* in the body. As long as these channels are in a condition of health, so long the whole body is free from disorders. There is a need to study the fundamental and applied aspect of *Mootravaha srotas* in order to understand *Ayurvedic* biology and disease processes in depth.

KEYWORDS: *Srotas*, *Mootravaha srotas*, Urinary system.

INTRODUCTION

The term *Srotas* means canal or channels. The word *Srotas* is applied to those body structures which are meant for transportation or secretion of materials. The word *Srotas* is derived from the *Sanskrit root*-‘*Sru*’. Meaning of ‘*Sru*’ is to secrete, to permeate, to flow. The structure through which substance is either secreted or circulated or transported is called ‘*Srotas*’.^[1] It is evident that different factors/substance in the body, to effectively conduct their physiological functions or pathological processes travel from one place to another. Since the functions of these factors/substances with possible opposite quantities are quite different it is assumed that the body provides separate pathways are called *Srotas*.^[2] The concept of the urinary system is explained under the *Mootravaha srotas*, in *Ayurveda*. It discharges the waste products, while efficiently conserving water and other valuable substances. *Acharaya Charak* contained two *Moolstana* of *Mootravaha srotas*- *Basti* (Urinary bladder) and *Vankshana* (Lumbosacral region).^[3] *Vagabhatt* supported *Charak* in this regard. *Acharayas Sushruta* contained two *Moolstana* of *Mootravaha srotas*- *Basti* (Urinary bladder) and *Medra* (Urethra).^[4] According to *Charak* abnormalities of these *Srotas* are responsible for voiding of too much of urine or the complete suppression of urine, impairment of the composition of urine and occasionally or frequently passing of thick urine associated with pain.^[5]

REVIEW OF LITERATURE

Mootravaha srotas in many facet which include the embryology, etymology, anatomy, physiology etc of

urinary system. In the texts description of the following anatomical structures like *Basti* (Urinary bladder), *Vrikka* (Kidney), *Gaveenee* (Ureter), *Mootrapraseka* (Urethra), *Mootravaha srotas* (Urinary system), *Mootravaha naadi* (Ureter), *Mootravaha dhamani*, (Renal arteries), *Mootravaha siraa* (Renal veins).

Basti* (Urinary bladder)*Synonyms** – *Mootraashaya*, *Mootraadhara*, *Mootrabasti*, *Mootraputa*, *Mootraputaka*.**Structure**

Basti is situated in the midst of the umbilicus, back, waist, scrotum, rectum, groins and penis, has one orifice and thin skin, placed with its face downward, *Basti* (Bladder), *Bastisiras* (Head of the bladder-fundus), *Paurusa* (Penis), *Vrsana* (Testicles) and *Guda* (Rectum) are inter related (connected) and situated inside the cavity of the Pelvis, Pelvic bone and Rectum. It is shaped like *Alabu* and supported by *Siraa* (Veins/Blood vessels) and *Snayu* (Ligaments). *Mootrasaya* (Urinary bladder) is the receptacle of *Mala* (Waste products) and an important seat of life.^[6]

Function

The main function of *Basti* is to store the formed urine. *Maladhara* is another term for *Basti*.^[7] The *karma* of *Mootraashaya* (urinary bladder) is *Dhaarana* and *Poshana*, which has been mentioned in relation of *Mootranirmaana*. *Dhaarana* and *Poshana karma* of urine are regulated by *Apaanavaayu*. The vitiation of

Apaanavaayu alters the physiology of *Basti* and leads to various disorders of *Basti*.^[8]

Vrikka (Kidney)

Vrikka is derived from the root “*Vikkadane*” means to take. No direct reference of *Vrikka*'s relation to urine formation is found in either of the *Ayurvedic* classics.^[9] It is derived from essence of *Rakta* and *Meda*. It have been told the root of *Medovahasrotas*.^[10] *Vrikka* are two in number and are situated in lumbar region in either sides in the posterior abdominal wall in “*Kostha*”.^[11] *Sarangadhara* has considered the *Vrikka*'s as the nourishes of the abdominal fats.^[12]

Gaveenee (Ureter)

The ureters are a pair of tubes that carry urine from the kidney to the urinary bladder. The ureters are about 10 to 12 inches long and run on the left and right sides of the body parallel to the vertebral column. Gavity and peristalsis of smooth muscle tissue in the walls of the ureters move urine toward the urinary bladder. The ends of the ureter extend slightly into the urinary bladder and are sealed at the point of entry to the bladder by the ureterovesical valves. These valves prevent urine from flowing back towards the kidney.^[13]

According to *Ayurveda*, it receiving *Mootra* from the *Antras* and sending it further to the *Mootrashaya*.

Mootrapraseka (Urethra)

Signifies the urethra, mainly its penile part. It is one among the eight important organs, which are to be sheltered from any injury at the time of performing surgery for *Mootrashmari*.^[14] It is aperture of *basti*, which are 2 angula in females and 12 angula in males. In males, it carries *Mootra* and *Shukra*, while in female it only carries *Mootra*.^[15] The urethra is the vessel through which urine passes after leaving the bladder. During urination, the smooth muscle lining the urethra relaxes in concert with bladder contraction to forcefully expel the urine in a pressurized stream. Following this, the urethra re-establishes muscle tone by contracting the smooth muscle layer and the bladder returns to a relaxed, quiescent state.^[16]

Mootravaha srotas

According to *Charak*, the definition of the word *srotas* is *Sravanat srotamsi*, which means, something oozes out. It is system which is responsible for formation, circulation, exertion and transportation of biological fluid, nutrient, metabolites, bodily wastes and also medicaments whenever used. The channels which carry *Mootra* can be considered as *Mootravaha srotas*. Any trauma to this *Mootravaha srotas* leads to acute retention of urine, distension of urinary bladder and painful erection of the penis, ultimately leading to death of the patients.^[17] The kidney and the rest of the urinary tract may become injured in a number of ways. Examples include injuries due to a blunt force or a penetrating force or surgery. Injuries to the urinary tract often occurs together with

injuries to other organs, especially abdominal organs. In men, the penis and testes may also be injured. Because the function of the kidney is to continuously filter out metabolic wastes from the blood and remove them from the body through the urinary tract, injuries to the kidney or urinary tract can leads to the inability to perform these functions. Other complications of injury include bleeding, leakage of urine from the urinary tract into surrounding tissues, and infection. Preventing permanent damage to the urinary tract and even death may depend on prompt diagnosis and treatment.^[18]

Mootravaha nadi

Sushruta in *nidanasthana* says that between the *Amashaya*, *Pakwashaya* and *Basti Mootravaha nadi* are situated. Which is satisfy the bladder by bringing urine always just like the rivers the ocean the mouths of these thousands of ducts are not visible because of their minuteness, these carry urine from the interior of the *Amasaya*, fill the bladder by oozing through its wall, both during waking and sleeping states.^[19] *Aacharya Dalhana* said that *Mootravahinadis* are two in number and have been told to divide into tens of thousands, which come out to be one million.^[20] Each kidney in the human contains about 8-10 million nephrons. It is the functional unit of kidney. Most of these functions concern the re-absorption and secretion of various solutes.^[21]

Mootravaha Dhamani

There are twenty four *Dhamani*, arising from the *Nabhi*. Among ten spread upward, ten downward and four sideward. The *Adhogami Dhamani* sub divides into three in between *Amashaya* and *Pakwashay*, thus total thirty in the number. *Dhamani* spreading downward purvey flatus, urine, faeces, semen and menstrual blood etc. downward. Out of which two are said to be the *Mootravaha Dhamani* is going to the *Mootrabasti*, the functions of this *Dhamani* is said to be *Dharana* and *Yapan* of *Mootra* and *Basti*.^[21]

Mootravaha siraa

There is no reference available in *Brihatrayee* about *Mootravaha siraa*. But *Sarangadhara* describes that the liquid waste of digested food i.e. *Mootra* is brought to the *Basti* by *Siraa* which can called as *Mootravaha siraa*.^[22]

Formation of urine

Purishdhara Kala in *Pakvashaya* separates undigested part of food (*Kitta*) into urine, faeces and *Vayu*.^[23] *Ayurvedic* physiology encompasses the phenomena of urine formation is that the ingested food after completion of digestive process converts into *Saara* and *Kitta* portion by the action of *Samana vayu*. The *Sara* portion is absorbed and utilized for the nourishment. The *Kitta bhaga* contains some nutrients and it is precursor of *Mootra* and *Pureesha*. The part of *Kitta* which is solid converts into *Pureesha* and liquid part converted to the *Mootra*.^[24]

Thus formation of urine starts just along with digestion of food and passes through three stages-

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

According to *Sushruta*, *Nadis* known as *Mootravaha* present in the *Pakvasaya*. Satisfy the bladder by bringing urine always just like the rivers the ocean, the mouths of these thousands of ducts are not visible because of their minuteness, these carry urine from the interior of the *Amasaya*, fill the bladder by oozing through its wall, both during waking and sleeping states. Just as a fresh earthen pot kept immersed in water upto its mouth gets filled with water through its sides, in the same way, it should be understood, that the bladder also gets filled with urine.^[25] When bladder gets filled with urine, under the control of *Apana vayu*, urine is excreted.

The fact that urine is formed in kidney has to be incorporated in *Ayurveda*. According to new thoughts of researchers, *Poshaka mootra* is formed in *Pakvashaya*. This is then absorbed in blood and then in kidneys many metabolic waste products mix with *Poshaka mootra*, and later on this *Mootra* is transferred to *Basti* by ureters. The process of micturition is controlled by *Apana vayu*.^[26]

DISCUSSION AND CONCLUSION

Here we can conclude that as our classics or *Acharayas* said in literature was so authentic that time, but as time passes we must re- modulate this, we will more able to understand that times concept more signifyingly. As per *Acharya Charak*, the detailed knowledge of normal human body is helpful to understand the factors influencing health and therefore such knowledge is widely appreciated by experts. *Mootravaha srotas* (urinary system) anatomy and physiology is quite limited and very much scattered. It is the need of time to research on anatomical and physiological aspects *Mootravaha-srotas* with the advancement of modern technology and its correlation of *Ayurveda* principles. There is a need to study the fundamental and applied aspect of *Mootravaha srotas* because it is impossible to do surgeries and treat diseases effectively without the deep knowledge.

REFERENCES

1. Prof. Dr. Subhash Ranade, A Textbook of Kriya Sharir, Vol-2, Chaukhamba Sanskrit Pratishthan Delhi, Reprint, 2018; Chap-5, Page no.47.
2. Dr. Chitta Ranjan Das, A Textbook of Physiology, Vol-1, Chaukhamba Sanskrit Pratishthan Delhi, Reprint, 2019; Chap-2, Page no.21.
3. The Charak Samhita expounded by the worshipful Atreya Punarvasu Compiled by the great sage Agnivesa and Redacted by Caraka & Drdhabala, Vol -2, Chaukhamba Orientalia, Varanasi, Reprint, 2008; Viman sthan, 5/8, Page no.810.
4. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta sharir 9/12, Page no.150.
5. Dr. Chitta Ranjan Das, A Textbook of Physiology, Vol-2, Chaukhamba Sanskrit Pratishthan Delhi, Reprint, 2019; Chap-4, Page no.133.
6. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition: 2012, Susruta nidan 3/18-20, Page no.487.
7. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta sharir 9/7, Page no.143.
8. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta nidan 9/18, Page no.523.
9. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta sharir 4/31, Page no.150.
10. Prof.K.R.Srikantha Murthy, editor of Sarngadhara samhita, Chaukhamba Orientalia Varanasi Reprint Edition-2016, Purva khand 5/45, Page no.
11. Ureters,http://www.innerbody.com/image_urinov/repo15-new2.html [cited on 20 jun 2016].
12. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-2, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta chikitsa 7/38, Page no.238.
13. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta sharir 4/22, Page no.57.
14. Urethra,<http://en.wikipedia.org/wiki/Urethra>[cited on jun 2016].
15. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta sharir 9/12, Page no.149.
16. Overview of Urinary tract and Genital injuries-and-poisoning/injury-to the-urinary -tract-and-genitals/overview-of-urinary-tract-and-genital-injury[cited On 20 june2016]
17. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition, 2012; Susruta nidan 3/21-23, Page no.487.
18. Vaidya Yadavji Trikamji Acharya, Sushruta Samhita of Sushruta with the Nibandha sangraha commentary of Sri Dalhan Acharya, Chaukhamba Orientalia Varanasi, Reprint edition 2009 Susruta nidan 3/21-23page no.
19. Hall E. Guyton C,Textbook of Medical Physiology,New Delhi, Sec.7, Page no.-485.
20. Prof.K.R.Srikantha Murthy, editor of Sarngadhara samhita, Chaukhamba Orientalia Varanasi Reprint Edition-2016, Purva khand 6/10-11, Page no.25.
21. Prof. K.R.Srikantha Murthy editor of Susruta Samhita, Vol-1, Chaukhamba Orientalia Varanasi Edition: 2012, Susruta sharir 4/17, Page no.56.
22. Vaidya Yadavji Trikamji Acharya, Sushruta Samhita of Sushruta with the Nibandha sangraha commentary of Sri Dalhan Acharya, Chaukhamba Orientalia Varanasi Reprint edition 2009 Susruta nidan 3/20-24,Page no.487.

23. Prof.Dr.Subhash Ranade, A Textbook of Kriya Sharir, Vol-2, Chaukhamba Sanskrit Pratishthan Delhi, Reprint, 2018; Chap-22, Page no.298.