

CRITICAL UNDERSTANDING OF MUTRA UTPATHI ACCORDING TO AYURVEDA

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ABSTRACT

Ayurveda is mainly based on *dosha, dhatu and mala*. *Mala* are the substances or waste matters That are excreted out of the body. They are by-products formed as a result of various physiological activities happening inside the body. *Purisha, Mutra* and *Sweda* are considered as the main excretory product of the body and called *mala*. Urine formation is one of the important physiological activities of the human body in which *Mutravaha Moola* and waste products of *Ahara Rasa* contribute significantly. *Basti, Mutravaha Srotansi, Vrikka, Mutravaha Nadies, Mutravaha Dhamanis* and *Mutravaha Sira*, etc. Are major body parts which play a significant role in the process of urine formation. While modern science described the urinary bladder, nephrons, kidneys, ureters and urethra, etc as vital parts of urine formations. This article tries to critically review the formation of urine according to *Ayurveda*.

Keywords: *Mala, Mutra, Mutravaha Srothas*, urine formation

INTRODUCTION

Mala are the substances or waste matters that are excreted out of the body. *Mala* are counted in two categories: *Annamalani* and *Dhatumalani*. *Annamala* is

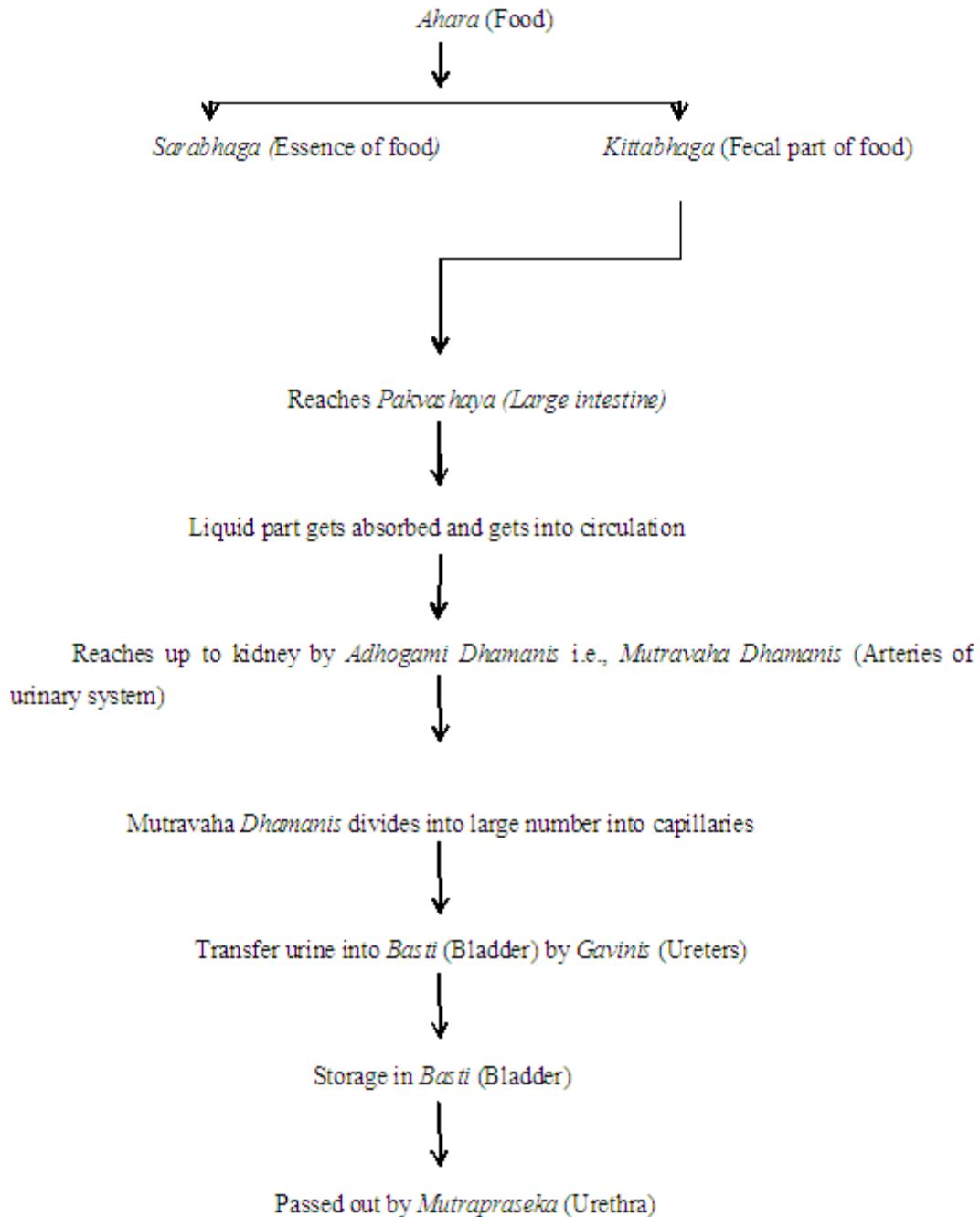
Purisa, Mutra and *Vayu*,¹also *Sweda* described by *As-tanga Hridayakara*². *Dhatumala* is eight in number as

suggested by Charaka³, seven in number as in *Sharangdhara Samhita*⁴. Purisa & Mutra are the important excretions from the human body. Mutra is a liquid waste product of the body secreted by the kidneys through a phenomenon of filtration from blood. In Ayurveda Mutra is formed in *Mutravaha strotas*. Main organs of *Mutravaha strotas* are *basthi* and *vangshana* according to *Susruta*. Ayurveda advocated that urine is formed from large intestines & not from kidneys. The first stage of urine formation begins in the large intestines where fluids are absorbed into the urinary system. In modern science, urine is formed by filtration and reabsorption.

URINE FORMATION AS PER AYURVEDA

There is evidence that proves that concept of the formation of urine is known since the Vedic period. The first description about the formation of urine is present in '*Atharvaveda*'. In *Atharvaveda*, it is mentioned that

Mutra Nirman (Urine formation) takes place in *Antras* (Alimentary canal) and it is transferred through *Gavini* (Ureters) and reaches *Basti (Bladder)*.⁵ Formation of urine in *Ayurveda* is related to '*Ahara (Food)*'. When food gets completely digested liquid portion enters *Pakvashaya (Large intestine)*. Liquid portion absorbed from *Pakvashaya (Large intestine)* is transported to *Basti (Bladder)* with the help of two *Nadi's* (Nerves).⁶ In *susrutha samhitha* in the chapter of *as-mari nidana mutra utpati* is explaining, vessels arising from the large intestine called *mutravaha naadi* fill the urinary bladder like a river feed water to the ocean on earth. they are so minute that they are not perceived. these vessels arise from *amashaya* and convey fluid to the bladder day and night. thousands of these vessels provide water, which exudes from vessels to inside of bladder posteriorly.⁷



Rasa (essence, plasma) is the nutrient portion of the blood, while its non-nutrient portion is called kitta, the liquid waste is brought to the *Vasthi* (urinary bladder) by the *Sira* and it assumes the name *mutra*.⁸

ORGANS INVOLVED IN URINE FORMATIONS

The principal organs of *Mutravahastrotas* are denoted as *Basti* (urinary bladder) and *Vankshana*.⁹ *Susruta*

also noted *Basti* and urethra as principal organs of *Mutravahastrotas*.¹⁰

Basti (Urinary bladder): - The detailed description of *Basti* (Bladder) is present in all *Ayurvedic* texts. There is no doubt that the structure of the *Basti* (Bladder) and urinary bladder is the same. *Basthi* is considered as one of *Kosthangas* amongst many inside the body. *Susruta Basti* is surrounded by *Nabhi*, *Kati*, *Mushka*, *Vakshanas*, *Shepha* and *Guda*. It stores and evacuates

urine thus play important role in the process of urinary excretion. *Basthi* word, the root "Vas" is used as "Vas Acchadane"¹¹. Its different meanings are, to cover, base, storehouse, and reservoir. In Ayurvedic texts, though no clear-cut definition of *Basti* (Bladder) has been given, from the grammatical derivations, it can be defined as a storehouse that acts as a reservoir of urine.

Vrikka: It is derived from the root "Vikkadane" which means to take.¹² The detailed Ayurvedic anatomy of *Vrikka* (Kidney) is present in all Ayurvedic texts. The position, development and its functions are well described all over but no direct reference of *Vrikka*'s (Kidney's) relation to urine formation or blood purification is found in either of the Ayurvedic classics.

Vrikka (Kidney) are two in number and are situated in the lumbar regions on either side in the posterior abdominal wall in *Koshtha* (Abdominal cavity).¹³

It mainly performs functions of urine formation & blood purification thus can be correlated with the kidney as per modern science. There are two *Vrikka* inside the body found in the lumbar regions at the abdominal wall in *Koshtha*. The major process of urine formation and blood filtration takes place in *Vrikka* thus it is considered as the main organ of the urinary system.

Gavini (Ureters): They are two in number, situated one on each side of *Basti* (Bladder), receiving *Mutra* (Urine) from the *Antras* (Alimentary canal) and sending it further to the *Mutrashaya* (Urinary bladder).¹⁴

Mutrapraseka (Urethra): It is one among the eight important organs, which are to be protected from any injury at the time of performing surgery for *Mutrash-mari* (Bladder calculus).¹⁵ It is the outlet of the *Basti* (Bladder), Which is two *Angulas* (A type of length measurement) in females and Twelve *Angulas* in males¹⁶ in the male, it carries both *Mutra* (Urine) and *Shukra* (Semen), while in female only *Mutra* (Urine).¹⁷

Mutravaha Srotas (Nephrons): *Mutravaha Srotas* performs functioning like micro-channels that carry *Mutra* and are considered Nephrons of modern science. *Mutravaha Srotas* (Nephrons) has its origin from *Basti* (Bladder) and two *Vankshanas* (Inguinal region).¹⁸ Whereas *Susruta* believes *Basti* (Bladder) and *Medhra* (Penis) as the roots of *Mutravaha Srotas*

(Nephrons)¹⁹ **Mutravaha Nadis (Nerves of the urinary system):** *Mutravaha Nadis* are thousand in number and are situated in between *Pakvashaya* (Large intestine) and *Basti* (Bladder).²⁰ The functions of these *Nadis* (Nerves) are *Mutra Nishyandana* (Filtration of urine) whether in state of awakening or sleep and carrying the *Mutra* (Urine) from *Pakvashaya* (Large intestine) to *Basti* (Bladder), like the rivers fill the ocean with water.²¹

Mutravaha Dhamanis: *Adhogami Dhamani* move downwards and transport *Mutra* and *Purisha*, they are a total of three types each of ten in number moving towards *Mutrabasti* to perform the function of *Dharana* and *Yapan* of *Mutra*.²²

Mutravaha Siras

These are considered as veins of the urinary system carrying *Mutra* to *Basti* since they open in a lateral side of *Basti* and helps in process of *Nishyandana*. *Sarangdhara* describes that the *Maladrava* (Liquid part of stool) of digested food i.e. *Mutra* (Urine) is transported to *Basti* (Bladder) by *Siras* (Veins).²³

Dosha involved in urine formation

- *Pachaka pitta* -help for digestion of *Ahara* and formation of *mutra*
- *Kledaka kapha* - help for the digestion of *ahara*
- *Samana vata* - help for separation
- *Apana vata* - excretion of urine

PROCESS OF URINE FORMATION ACCORDING TO MODERN

Urine formation is a blood cleansing function. Normally, about 1,300 ml of blood (26% of cardiac output) enters the kidneys. Kidneys excrete unwanted substances along with water from the blood as urine. Normal **urinary output** is 1 L/day to 1.5 L/day.

Processes of urine formation

- Glomerular filtration
- Tubular reabsorption
- Tubular secretion.

GLOMERULAR FILTRATION

Glomerular filtration is the process by which the blood is filtered while passing through the glomerular capillaries by a filtration membrane. It is the first process of urine formation. The structure of the filtration membrane is well suited for filtration.

The high pressure of blood into these capillaries facilitates the process of filtration. The protein and blood cells are retained while most of the other materials coming with blood circulation reached Bowman's capsule to form ultrafiltrate with the rate of 125ml/min.

TUBULAR REABSORPTION

Tubular reabsorption is the process by which water and other substances are transported from renal tubules

Back to the blood. Some essential substances (potassium, sodium chloride, amino acids, bicarbonate, and water) are reabsorbed at the tubular part of the nephron through passive and active transport. The process of other co-transport also facilitates tubular reabsorption.

TUBULAR SECRETION

Tubular secretion is the process by which the substances are transported from the blood into renal tubules. It is also called tubular excretion. In addition to reabsorption from renal tubules, some substances are also secreted into the lumen from the peritubular capillaries through the tubular epithelial cells.

Peritubular capillaries help to secretions, substances that are not filtered through glomerular filtration like some drugs secreted into the filtrate by the process of tubular secretion. The ion exchange also facilitates the process of tubular secretion.²⁵

With all these changes, the filtrate becomes urine. The nephron mainly involves in the formation of urine and each nephron is made by renal corpuscle and renal tubule. The renal corpuscle is further divided into glomerular capillaries and Bowman's capsule, these organs mainly perform filtration of blood from the urinary fluid. The afferent arteriole brings blood into the glomerulus while the efferent arteriole takes blood away from the glomerulus.

The renal tubular parts are also divided into various parts, Proximal Convoluted Tubule, Loop of Henle and Distal Convoluted Tubule. The Proximal Convoluted Tubule reabsorbed substances, ions, and water. The loop of Henle performs reabsorption and secretion of water while Distal Convoluted Tubule helps in restoration of ions and water.²⁶

DISCUSSION

Both modern science and Ayurveda have described the formation of urine by their principles. *Ayurveda* science is more observed than investigated. References in *Ayurvedic* literature shows that the first stage of urine formation starts from large intestines where digested food is divided into *Sara* and *Kitta*. From the *Kitta* part, *malas* are formed. The solid part of *Kitta* is converted into *purisa* and the liquid part goes to *Mutravaha strotas* converted into *mutra*. Organs of *Mutravaha strotas* are *basthi* (Urinary bladder) and *vankshana* (Urethra). Urine is expelled through *vankshana* (urethra). Hence, urethra is suggested as the principal organ for *Mutravaha strotas*. In the disorder of the urinary bladder, the expulsion of urine is difficult. So, the bladder is also a principal organ of *Mutravaha strotas*. Other references in the genesis of organs in intra-uterine life in the viewpoint of *Ayurveda* postulates that intestines, anus & urinary bladder are of the same embryological origin. According to modern science Urine is considered as a waste product of the body containing urea, uric acid, water, salt, and other waste products. The major process occurs inside the kidney in three major stages: Glomerular Filtration, Tubular Reabsorption and Tubular Secretion.

CONCLUSION

Mutra is formed from *sara kitta vibhajana* of *Ahara rasa*. The solid part of *Kitta* is converted into *purisa* and the liquid part goes to *Mutravaha strotas* converted into *mutra*, Organs of *Mutravaha strotas* are *basthi* (Urinary bladder) and *vankshana* (Urethra).as urine is stored in *basthi* and expelled through *vankshana*. In the disorder of the urinary bladder, the expulsion of urine is difficult. So, *basthi* is also a principal organ of *Mutravaha strotas*. Other references in the genesis of organs in intra-uterine life in the viewpoint of *Ayurveda* postulates that intestines, anus & urinary bladder are of the same embryological origin. Modern science defines, urine formation occurs in kidneys & then carried by ureters to the urinary bladder and expelled by the urethra

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