



Review Article

REVIEW OF MODERN AND AYURVEDIC PERSPECTIVES OF URINARY TRACT INFECTIONS W.S.R. TO PITTAJA MUTRAKRICHHRA

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ABSTRACT

Urinary disorders have been vividly described in Ayurveda. *Mutraroga* are classified as *Mutra-Apravrtijanya* and *Mutra-Atipravrtijanya Roga* in *Ashtanga Hridaya Nidana*. *Mutrakrichhra* and *Mutraghata* are two main diseases which are included under the *Mutra-Apravrtijanya* disorders. *Mutraghata* means the *Alpapravriti* of urine where as *Mutrakrichhra* seems to be due to the painful process of micturition. The disease *Pittaja Mutrakrichhra* was well acknowledged in *Samhitas* with different treatment modalities, which can be concurrent to urinary tract infections on theoretical and clinical symptomatology of disease. Eight types of *Mutrakrichhra* are described in details in *Madhav Nidana*- i.e., *Vattaja*, *Pittaja*, *Kaphaja*, *Sannipataja*, *Shalyaja*, *Ashmrija*, *Shukraja*, *Purishaja Mutrakrichhra*. All the *Nidana* of *Mutrakrichhra* ultimately results in the *Tridosha prokopa* and *Mandagni* (Aam production) which along with *Kha Vaigunya* initiates further pathogenesis and its features are *Sadaha Mutrata*, *Peeta Mutrata*, *Sarakta Mutrata*, *Krichhra Mutrata*, *Saruja Mutrata* and *Muhur muhur Mutrata*. This purpose of the article is to understand the modern concept of urinary tract infections with Ayurvedic concept of *Pittaja Mutrakrichhra*.

INTRODUCTION

The disease “*Pittaja Mutrakrichhra*” is the main and leading disorder of the urogenital tract. The *Mutra Roga* are prevalent since the *Vedic* period. The disease *Pittaja Mutrakrichhra* was well acknowledged in *Samhitas* with different treatment modalities, which can be concurrent to urinary tract infections on theoretical and clinical symptomatology of disease. *Vasti* is the seat of urine and known as *Prana Ayatana* [1]. *Vasti*, the *Srotomula* of the *Mutra* is one among the *Trimarma* [2]. The *Apana Vayu* is responsible for the regulation of urinary system and vitiated *Apana Vayu* results in various *Mutra Vikara* [3]. In classical texts, eight types of *Mutrakrichhra*, thirteen types of *Mutraghata*, four types of *Ashmari* and twenty types of *Prameha* are described [4].

Types of *Mutrakrichhra* are described in details in *Madhav Nidana* and the eight types are as follows i.e., *Vattaja*, *Pittaja*, *Kaphaja*, *Sannipataja*, *Shalyaja*, *Ashmrija*, *Shukraja*, *Purishaja Mutrakrichhra* [5].

The term *Mutrakrichhra* originates from two words- *Mutra* and *Krichhra*. The word *Mutra* was derived from ‘*Prasrava*’ means to ooze [6]. The word ‘*Krichhra*’ was derived from ‘*Kashte*’ which means causing difficulty or pain. *Krichhratva* is the cardinal feature of *Mutrakrichhra* [7].

Pittaja Mutrakrichhra is equivalent to urinary tract infections. Various stages of acute and chronic urinary tract infections which constitute inflammatory conditions can be correlated with different types of *Mutrakrichhra*. Despite the advances in the understanding of the causes and consequences of UTI, it remains a common health issue in the community. Urinary tract infections occur in all populations from younger to elder patients. A urinary tract infection occurs far more commonly in females than in males [8]. A urinary tract infection is a condition in which bacteria enters, persists and multiply within the urinary tract [9]. The infection is mostly caused by Gram-negative bacteria i.e., *Escherichia coli* is the most

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common bacteria responsible for causing more than 80% community acquired UTI [10]. Other gram-negative bacilli, especially *Proteus*, *Pseudomonas*, *Klebsiella* and occasionally *Enterobacter*, accounts for a smaller proportion of uncomplicated infections [11]. Gram-positive cocci play a lesser role in urinary tract infections, none the less *Staphylococcus saprophyticus*, *Enterococci*, *Staphylococcus aureus* are associated with acute urinary tract infection in young females and in-patient with renal stone or previous instrumentation [12]. It may manifest as acute or recurrent uncomplicated cystitis, acute uncomplicated pyelonephritis, relapsing, recurrent or complicated pyelonephritis or asymptomatic bacteriuria [13]. Though all forms of urinary tract infections start as a minor ailment, they often have a tendency to recur and relapse. Repeated lower urinary tract infection has a tendency towards ascending involvement of upper urinary tract.

Table 1: Adhikarana of disease in Samhitas

Samhita	Sathana	Chapter
Charaka Samhita	Sutra, Chikitsa, Sidhi Sathana	26 th , 12 th
Sushruta Samhita	Uttaratantra, Nidana Sathana	59 th
Ashtanga Hridya Samhita	Nidana Sathana	9 th
Ashtanga Sangreh Samhita	Nidana Sathana	9 th
Madhava Nidana		30 th

Aetiology (Nidana) [14]

व्यायामतीक्ष्णौषध रुक्षमद्यप्रसंगनित्यदुतपृष्ठयानात् ।

आनूपमांस अध्यशायनाद् जीर्णात्स्यूर्मूत्रकृच्छ्राग्निनृणामिहाष्टौ ।

Excessive exercise or exertion, journey on fast moving vehicles or fast horse riding, strong medication, excessive intake of *Ruksa* food, alcohol, *Anupa Mamsa*, *Adhyasana*, *Ajirna*, over indulgence in sexual activity and other traumatic causes leading to *Mutrakrichhra*.

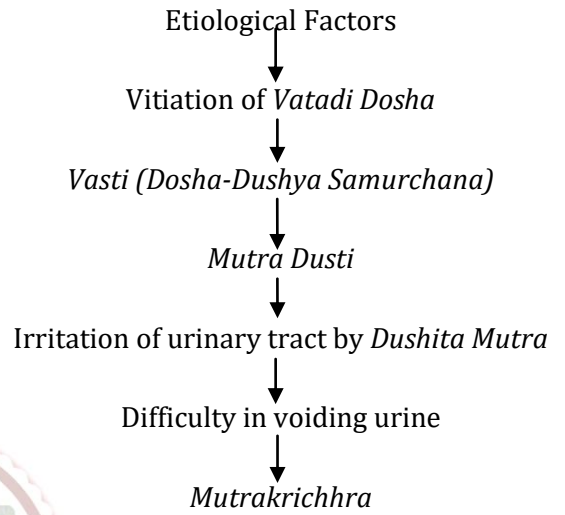
The above mentioned causes either lead to trauma to lower urinary tract e.g. over indulgence in sexual activity, journey on fast moving vehicles, lead to metabolic derangements in body. It alters the normal composition of urine and pH of urine, thus cause inflammation in urinary tract e.g. dehydration makes the urine concentrated and thus increase in urinary pH. Likewise, strong oral medication, are excreted through urine, causes inflammatory changes in urinary tract.

Pathogenesis [15]:

पृथग्मलाःस्वैःकुपितानिदानैःसर्वेऽथयाकोपमुपेत्यवस्तौ ।

मूत्रस्यमार्गपरिपीडयन्तियदातदामूत्रयतीहकृच्छ्रात् ॥

The *Dosha* (individual or altogether) are vitiated by the above mentioned aetiological factors. The vitiated *Dosha* entered into *Vasti* and cause *Dosha-Dushya Samurchana* in individual where *Kh-Vigunya* is already there. Hence *Mutra Dushti* manifests. *Dushit Mutra* causes irritation and spasm of urinary passage and leads to difficulty in micturition process.



Types of Mutrakrichhra

All the aetiological factors contribute to the occurrence of *Mutrakrichhra Vyadhi*.

8 types of *Mutrakrichhra* have been described in *Charak Samhita*. These types are as follows: [16]

- 1) *Vataja Mutrakrichhra*
- 2) *Pittaja Mutrakrichhra*
- 3) *Kaphaja Mutrakrichhra*
- 4) *Sannipataja Mutrakrichhra*
- 5) *Raktaja Mutrakrichhra*
- 6) *Shukraja Mutrakrichhra*
- 7) *Ashmarija Mutrakrichhra*
- 8) *Sharkaraja Mutrakrichhra*

Eight types of *Mutrakrichhra* are described in *Sushruta Samhita*. Possibility of *Shukara* causing *Mutrakrichhra* was not recognized. However separate description of *Mutrashukra* under the heading *Mutraghata* is available [17].

Doshaja Mutrakrichhra has mentioned in *Ashtang Hridya Sangreh*. 1) *Vataja* 2) *Pittaja* 3) *Kaphaja* 4) *Sannipataja* [18].

Pittaja Mutrakrichhra [19]

पीतं सरक्तं सरुजं सदाहं कृच्छ्रान्मुहुर्मूत्रयतीह पितात् ।

- Yellowish discolouration of urine
- Hematuria
- Painful micturition
- Burning micturition

- Difficulty in micturition
- Increased frequency of micturition

Rupa (Symptomatology)

Pratyatma lakshana

मूत्रकृच्छ्रमिति मूत्रस्य कृच्छ्रेण महता दुःखेन प्रवृत्तिः [20]

रोमहर्षो अगर्हर्षश्च मूत्रकाले च वेदना । मूत्रकृच्छ्रे दशव्योष्ठो बस्ति स्पृशति पाणिनां ॥ [21]

Complications [22]

विशेषाः सन्निपातोत्थे मूर्च्छा भ्रमविलापका ।

सर्वेषु काश्यमरतिररूचिः सानवस्थितिः ॥

तृष्णाशूलं विषादातिस्त एव स्युरूपद्रवा ।

Updrava of *Mutrakrichhra* has not been mentioned in *Charaka Samhita* and *Susruta Samhita*. But *Kashyapa Samhita* has given a short description of *Updrava* of *Mutrakrichhra* (as cardinal features of *Sannipatika Mutrakrichhra*). These are described as weakness (*Kshya*), malaise (*Arati*), loss of appetite (*Aruci*), thirst (*Trishna*), pain (*Shula*), depression (*Visada*), coma (*Murcha*), dizziness (*Bhrama*), delirium (*Pralipa*) and uneasiness in psyche has been described.

Chikitsa (Management)

"संक्षेप्तःक्रियायोगोनिदानपरिवर्जनम्" [23]

It is the first principle of management. The aetiological factors are responsible for the initiation of disease and these factors should be addressed in the beginning of treatment.

Antahparimarjana Chikitsa [24-25]

Shamana chikitsa: It includes *Mutravishodhaniya*, *Mutra-virechaniya Chikitsa*.

Shodhana chikitsa: It includes *Mutral Dravya* & *Uttara Vasti*. These increases frequency and quantity of *Mutra* which helps to flush out various infective agents.

Bahirparimarjana Chikitsa [26]: These medicines are used locally (externally) in the form of showers, fomentation, *Potalis* (treatment through medicated bag/pouch) and ointments etc.

Specific Management (Pittaja Mutrakrichhra Chikitsa):

Antahparimarjana Chikitsa

Shodhana [27] - *Virechana Karma* should be done with *Tikta evam Madhur Kashaya Dravya* and *Uttara Vasti* should be given. If *Kapha Dosha* is predominant then *Vamana Karma* is performed, if *Pitta Dosha* is predominant then *Virechana Karma* is performed and if *Vata Dosha* is predominant then *Vasti Karma* should be performed.

Shamana: *Shatavaryadi Kwatha (Ch.)*, *Trinapanchamula Churna (Su.)*, *Haritakiyadi Kwatha*, *Trinapanchamula Kwatha (Y.R.)*, *Ervaru Veeja*, *Yastimadhu*, *Devdaru* with *Tandul Dhavan*.

Bahirparimarjana Chikitsa [28]- *Avagahana* in cold water, *Sheeta Parisheka*, *Pralepana* with *Chandana* and *Karpur*.

Pathya: *Purana Shali*, *Yava*, *Kshara*, *Takra*, *Nadeya Jala*, *Dugdha*, *Dadhi*, *Jangal Mamsa*, *Mudga Yusha*, *Trapusha*, *Sharkara*, *Patola Patr*, *Kushmanda*, *Ardraka*, *Gokshura*, *Narikela*.

Apathya: *Tambula Sevan*, *Lavana*, *Tikshna* and *Amla Dravya*, *Hingu*, *Tila*, *Sarshapa*, *Matsaya*, *Masha*, *Karira*, *Vidahi*, *Ruksha*, *Virudhashana*, *Vishamashana*, *Yana Gamana*, *Vega Dharana*.

Modern Perspective

Urinary tract is a common and painful human illness that, fortunately, is rapidly responsive to modern antibiotics therapy. UTI accounts the second most common infections that occur mostly in women and app. 20% women had UTI once in their lifetime [29]. The prevalence of urinary tract infection (UTI) increases with age in both women and men. These infections are leading causes of morbidity and health care expenditure in persons of all ages. Urinary tract infection refers to both microbial colonization of the urine and tissue invasion of any structure of the urinary tract. The urinary tract comprises of kidney, ureter, bladder and urethra. Based on site of infection, the urinary tract infections involve cystitis (bladder), pyelonephritis (kidney), prostatitis (prostate) where bacteria invades and symptoms of UTI occurs [30]. Bacteria are most commonly responsible, although yeast, fungi and viruses may produce urinary tract infection. The infection is mostly caused by Gram-negative bacteria i.e., *Escherichia coli* which is responsible for approximately 80% of acute infections in patients without catheters. Other Gram-negative bacilli, especially *Proteus*, *Pseudomonas*, *Klebsiella* and occasionally *Enterobacter*, account for a smaller proportion of uncomplicated infections. Gram-positive cocci play a lesser role in urinary tract infections, none the less *Staphylococcus saprophyticus*, *Enterococci*, *Staphylococcus aureus* are associated with acute urinary tract infection in young females and in-patient with renal stone or previous instrumentation [31].

Definition

Multiplication of microorganisms in the urinary tract is known as urinary tract infection and is defined as the presence of more than 10^5 organism/ml in the midstream sample of urine [32].

Urinary tract infection can be subdivided into two anatomic categories, lower tract infection (urethritis and cystitis) and upper tract infection (acute pyelonephritis, prostatitis and internal and perinephric abscesses) [33]. Features of lower UTI include painful micturition, frequent urination, and feeling of incomplete voiding despite having an empty

bladder. Superficial or mucosal infections include infection of urethra and urinary bladder, where as signify tissue invasion include pyelonephritis and renal suppuration [34]. Basically, there are 3 forms of UTI i.e., pyelonephritis, cystitis and asymptomatic bacteriuria [35]. Less common conditions are focal pyelonephritis and renal abscess. From a microbiological perspective, when pathogenic microorganisms are present in the urine, urethra, bladder and kidney then the urinary tract infection exists. When the symptoms like urgency dysuria and frequency unaccompanied by significant bacteriuria has been called as acute urethral syndrome. Although widely used, the term acute urethral syndrome lacks anatomic precision because most of the cases which were designated are actually urinary bladder infections. Moreover, in these patients, the causative agent can usually be identified, so that the term syndrome- implying unknown causation is inappropriate.

Epidemiology

Epidemiologically, urinary tract infections are subdivided into catheter-associated (or nosocomial) infections and non-catheter associated (community-acquired) infections. Infections in either category may be symptomatic or asymptomatic. UTI generally occur in 1 to 3% among school girls and incidence markedly increases with the onset of sexual activity in adolescence [36]. The vast majority of acute symptomatic infections involve young women; a prospective study demonstrated an annual incidence of 0.5 to 0.7 infections per patient year in this group. Acute symptomatic urinary tract infections are unusual in men under age of 50. The development of asymptomatic bacteriuria parallels that of symptomatic infection and is rare among men under 50 but common among women between 20 and 50. Asymptomatic bacteriuria is more common among elderly men and women, with rates as high as 40 to 50% in some studies [37].

Etiology

Microbes are responsible for UTI, as they invade into the urinary tract and thus form the colonies in the urinary tract [38]. The most common cause of UTI is bacterial infection with *E. coli* being the most frequent pathogen, causing 75.90% of UTIs [39]. UTI is caused by bacterial species that includes both gram negative bacteria and gram positive bacteria - *Klebsiella*, *Proteus*, *Pseudomonas*, *Citrobacter*, *Enterococcus species*, *Staphylococcus*, *Saprophyticus*, *Urea plasma* [40]. *Candida species* is also causative organism for UTIs commonly; in immunosuppressive conditions they invade and cause the infection by inhibiting the growth of normal microbiota in mucosal membrane. *Candida albicans* is known as the most

common *candida* species [41]. *Klebsiella* species and certain Gram-negative non-fermenting bacteria are encountered in hospital acquired infections. The proteus groups of organisms are commonly seen in presence of calculus disease. *Pseudomonas aeruginosa* is seen following catheterization or instrumentation of urinary tract in hospitals. Fungal infections supervene in subjects with longstanding urinary catheters or prolonged antibiotic therapy, and in immunocompromised hosts like those with malignancies or following organ transplantation. The diabetics are especially vulnerable [42].

Pathogenesis [43]

Pathogen establishes infection by ascending from the urethra to the bladder in majority of UTIs. Infection is most often due to bacteria from the patient's own bowel flora. There are other routes by which bacteria can transfer into urinary tract are via the blood stream, lymphatic or by direct extension. But ascending transurethral route is the commonest route. For this route of infection three important steps are involved.

First Step: The lower vagina and periurethral area is heavily colonized by uropathogens.

Second step: These pathogens are transferred along the urethra to the bladder.

Third step: The third and most important step is the establishment and multiplication of bacteria (pathogens) within the bladder.

Clinical Presentation

Clinical symptoms cannot be solely relied upon to diagnose and localize urinary tract infection. There were no symptoms present in patients with significant bacteriuria. Patients with significant bacteriuria present with different symptoms of cystitis, urethritis and pyelonephritis [44].

Urethritis and cystitis are characterized by inflammation of the urethra and bladder with symptoms. Symptoms are dysuria, suprapubic discomfort, increased frequency of urine, gross hematuria and fever may or may not be present [45]. Fever is a common symptom found in case of any invasive infection in the kidney [46].

Prostatitis refers to inflammation of the prostate gland with symptoms like urgency, frequency, dysuria, fever, myalgia and perineal pain [47].

Pyelonephritis is a disease which is associated with renal parenchyma and clinical features include fever with chills, frequency, urgency, dysuria, abdominal pain, nausea, vomiting and anorexia [48].

Asymptomatic bacteriuria means the presence of bacteria in significant numbers in the urinary tract i.e.,

105/ml in freshly voided midstream sample of urine without any symptoms [49].

Diagnosis

UTI can be diagnosed on the basis of history and clinical examinations. More than 60% females who present with symptoms of cystitis did not develop UTI [50]. Complete urine examination reveals pus cells, epithelial cells, bacteria, red cells, pyuria, bacteriuria and WBC casts [51]. Dipstick test are used to detect nitrate in the urine. This test detect significant pyuria depend on the release of esterase from leukocytes. Positive dipstick test for both leukocyte esterase and nitrate are highly predictable for acute infection [52]. Urine culture and sensitivity is the gold standard for diagnosis of UTI. This diagnosis method is used to treat the causative organism and also to determine the antimicrobial therapy for UTI. Other non invasive techniques like renal ultrasonography and MRI can be used to obtain urinary tract images and thus UTI can be diagnosed with more consistently [53].

Treatment

The goal of therapy is symptomatic relief in patient of UTI. Symptomatic relief includes adequate hydration, frequent voiding of urine, alkalinisation of urine [54]. With appropriate antibiotics therapy, clinical responses occur within 24 hours for cystitis and 48-72 hours for pyelonephritis. If relief is not obtained in 72 hours than further workup with imaging studies should be done to find out the cause. The therapy should be given to patients will be less toxic and have low potential of changing the normal bowel flora [55]. Acute cystitis must be treated instantly to prevent progression to pyelonephritis. A sample of urine is taken from bladder for urine culture, but the symptoms are severe, then immediately start the treatment without waiting the result of urine culture. But when the symptoms are mild or the diagnosis is not clear then the treatment can be delayed until the results of culture are known. If the result is uncertain then the culture can be repeated. For example, if a gram-negative -organisms grow between 10^4 and 10^5 colonies in a midstream culture of urine, then a second culture may be taken by catheterization before the treatment is started [56]. The choice of antibiotic depends upon the result of urine culture and sensitivity of urine. Commonly used antibiotics include cotrimoxazole (trimethoprim and sulfamethoxazole 1 double strength tab. twice daily), ampicillin, amoxicillin, nitrofurantoin and quinolones. Oral 3rd-generation cephalosporins, cefixime are effective against a variety of gram-negative micro-organisms other than the *Pseudomonas* as effective as parenteral ceftriaxone, and these medications are considered by

some supremacy as the treatment of choice for oral therapy [57].

CONCLUSION

- The *Nidana, Lakshana* and *Chikitsa* of *Mutrakrichhra* can be well correlated with that of urinary tract infections.
- Females likely to be more prone than men because of their shorter urethra.
- Signs and symptoms of urinary tract infections mentioned in Modern texts are similar to that of *Pittaja Mutrakrichhra*.
- Chronic urinary tract infections and if remains unchecked causes irreversible damage to the kidney leading to chronic renal failure.
- It is a *Vata* predominant *Tridoshaja Vyadhi* involving *Mutravaha Srotas* with *Dushti* of *Mutra* and *Ambu*.
- *Nidanaprivarjanam* is the first line treatment in both Ayurveda and modern management.

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