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Homoeopathic management of urinary tract infection by *Copaiva officinalis* and *Equisetum hyemale*: A case series

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Abstract

Urinary tract infection is the second most common infection of human body. The uropathogens causing UTI vary by clinical syndromes but are usually enteric gram-negative rods that have migrated to urinary tract. *Copaiva officinalis* and *Equisetum hyemale* are the two important Homoeopathic remedies indicated in UTI and their source is vegetable kingdom. This study was conducted with the intention to know the effectiveness of *Copaiva officinalis* and *Equisetum hyemale* in urinary tract infection by estimating urine epithelial and pus cells. A sample of 20 cases was taken from the patients presenting with clinical signs and symptoms of urinary tract infection visiting the outpatient and inpatient department of Government Homoeopathic Medical College, Trivandrum.

Keywords: Homoeopathic, management, urinary, infection, *Equisetum hyemale*

Introduction

Urinary tract infection is a major global public health issue [1]. Urinary tract infection is defined as the presence and multiplication of bacteria or other microorganisms in the urinary or genitourinary tissue which is normally sterile [2]. The susceptibility pattern of these organisms varies by clinical syndrome and geography [3]. Depending upon the virulence of organism, symptoms of UTI vary [4]. Presence of epithelial cells, pus cells and bacteria during microscopical examination of urine indicate UTI. Urinary tract infections are more common in women of child bearing age group [5].

The risk factors of urinary tract infections are [6]:

- Age - The rate of urinary tract infections in women increases with age.
- Poor bladder evacuating.
- Use of diaphragm and condoms with spermicidal foam as contraceptives.
- Immunosuppression with certain medications or drugs.
- Diabetes mellitus.
- Menopause.
- Instrumentation of urinary tract.
- Abnormalities of urinary tract.
- Frequent intercourse.
- Vulvovaginal atrophy.
- Change of local bacterial flora in urinary tract.

Symptoms of urinary tract infections are [7]:

- A strong, persistent urge to urinate
- A burning sensation while urinating
- Passing frequent small amounts of urine
- Cloudy appearance of urine
- Strong smelling of urine

Conventional mode of treatment of urinary tract infection is by the use of antibiotics or by antimicrobial therapy. But here, there is an increased risk for bacteria to develop resistance against antibiotics [8].

As these bacteria are becoming resistant to antibiotics, UTI likely to face more problems in near future. So, it is essential that alternative strategies need to invent.

Homoeopathy is one of the most effective forms of complementary or alternative medicine. In Homoeopathy, holistic approach is followed considering all the spheres of individual. Homoeopathic medicines strengthen immunity of person and healing takes place within outward. *Copaiva officinalis* and *Equisetum hyemale* are the two main Homoeopathic remedies from vegetable kingdom have a very good action in UTI. *Copaiva officinalis* acts powerfully on mucous membranes especially of urinary tract [9]. *Equisetum hyemale* also has principal action on urinary bladder [9].

Need of the study

UTI itself contributes for 15% of all community prescribed antibiotics [10]. Antibiotic resistance need to be checked for treatment before identifying the pathogen [11]. Resistance pattern found more in gram negative isolates as compared to gram positive isolates. Alarming facts coming to light that most of the organism found resistance to one or more antibiotics [11]. So, this situation makes it necessary to find out other preventive and therapeutic strategies in near future.

Anatomy of human urinary tract

The human urinary tract is a hollow organ system whose primary function is to collect, transport, store and expel urine in coordinated manner. It excretes metabolic and toxic wastes produced by kidneys [12]. It is made up of renal papillae, renal pelvis, ureters, urinary bladder and urethra [12]. In males, bladder base rests on the endopelvic fascia and the pelvic floor musculature. Their internal urethral sphincter is well formed. Urethra is generally between 13 and 20 cm in length [13]. Prostatic secretions slow down bacterial growth.

In females, base of bladder and urethra rest on the anterior wall of vagina. Internal urethral sphincter is not well developed. Female urethra is shorter than the male. It is 3.8 to 5.1 cm long. The opening of female urethra is very close to the vagina and anus where the microorganisms reside. Though the vagina is not a part of urinary tract, it has a key role in urinary tract pathogenesis. In vagina of the reproductive women, lactobacilli are present which produces lactic acid. It leads to low pH which is unfavorable for the growth of uropathogenic organisms.

Physiology of Micturition

Urine production is a work of renal-glomerular filtration and tubular reabsorption and is regulated by systemic hydration state and electrolyte balance. Urinary filtrate is passed through nephron. It travels from the cortex and medulla and is concentrated through counter-current mechanism [14]. Urine leaves the kidney at renal papillae and is transported through the upper collecting system. This process of constant urine flow in the upper urinary tract and intermittent elimination from the lower urinary tract plays a key role in cleansing the urinary tract, expelling microbes that have gained access [15]. Ureteral contractions occur two to six times per minute and it forces the urine down the length of ureters and then into the bladder. Recent studies concluded that the most Uropathogenic *Escherichia coli* have the ability to impair ureteric contractility via calcium-

dependent mechanism. UTI pathogenesis happens due to urine stasis which is the result of any structural or functional process that interferes the flow of urine.

Aetiology of urinary tract infections

Various pathogenic agents are responsible for urinary tract infections. Out of these 80% of infections are caused by *E. coli*. Other less common gram-negative bacterial pathogens include *Klebsiella*, *Enterobacter* and *Proteus* species [16]. Some of gram-positive bacteria are *Staphylococcus saprophyticus*, *Staphylococcus aureus*, other *Staphylococci*, *Enterococcus* species and *Streptococcus* species. There are some anaerobic gram-positive organisms like *Pepto coccus*, *Neisseria gonorrhoea*, fungi like *Candida* species, *Aspergillus* and parasites like *Schistosoma haematobium*.

Pathogenesis of urinary tract infection

When the host defense mechanism is impaired due to the reaction of virulence of bacteria, biological and behavioral factor of host, then UTI occurs [17]. Uropathogenic *Escherichia coli* (UPEC) have a tendency to adhere more tightly to the urothelium and vaginal epithelium by fimbriae or pili. Then it invades the superficial cells forming intracellular bacterial colonies. UPEC makes capsular polysaccharide that helps to biofilm formation which help bacteria to protect from immune defense mechanism and antibiotics.

Complication

Most common complications are recurrent infection, permanent damage to kidneys due to untreated UTI, increased risk in pregnant women of delivering low birth weight or premature infants, urethral narrowing and sepsis [18].

Diagnosis

Diagnosis is being done on the basis of clinical features and urine microscopic analysis.

Homoeopathic concept of bacteriology

1880s considered as the era of science of disease of germs, that is bacteriology. In 1886, the German physician Robert Koch discovered *Anthrax bacilli* and then same get added in the realm of medicine. This theory popularly called as germ theory where specific bacterium gets link to the specific disease [19]. Long before the discovery of tubercle bacillus, Dr. Hahnemann was the first to recognize the role of bacteria in epidemic and chronic disease in 1818 [20]. His discovery was that the existence of living, specific, infectious microorganism as the cause of greater part of all true diseases. According to Stuart Close, Hahnemann was the first among to perceive and teach the parasitical nature of infections or contagious diseases [20]. In 1830, Hahnemann stated the parasitical nature of cholera.

Dr. Kent stated that bacteria are the end product of disease, they are not the cause of disease. They are scavengers and perfectly harmless in all aspect. So, we conclude that the presence of bacteria does not meant infection. To actual disease to take place, body must take part in it [21]. John Paterson commented that pathogenic bacteria present in the normal healthy body may become harmful if any disturbance in the condition of host. Causative factors such as habits of life, atmospheric conditions, persons hereditary endowment, nutritional state, physical, mental and

emotional state etc. all in some combination modify and determine the susceptibility of individual to the bacilli. Among them, bacilli are one of the causative factors. In the absence of this factor bacilli alone is insufficient and disease will not occur. Hence, bacilli are not the sole cause of the disease, it is only one of the possible factors in the group of cause of disease. All these together modify the state of health and leads to disease condition^[22].

Copaiva Officinalis and *Equisetum hyemale*

Copaiva officinalis acts powerfully on mucous membranes especially that of urinary tract. It is indicated for painful micturition with dribbling, retention of urine with pain in bladder, catarrh of bladder (cystitis), dysuria, constant desire to urinate and swelling of orifice (urethritis). Urine has a greenish turbid color and a peculiar pungent odor^[25].

Equisetum hyemale has also principal action on urinary bladder. It is a good remedy for enuresis and dysuria. It is indicated for severe dull pain in bladder^[26]. Also associated with a feeling of fullness in the bladder not relieved by micturating, frequent urging with severe pain at the close of micturition. Urine flows only drop by drop and there is sharp, burning, cutting pains in the urethra while micturating^[27]. *Equisetum hyemale* is also a good remedy for incontinence in old women, retention and dysuria during pregnancy and after delivery, much mucus in urine, involuntary micturition and albuminuria^[25].

Urinary tract infections cause discomfort, substantial health care cost, minor morbidity and time lost from the work. Microorganisms causing urinary tract infections are changing their features and become resistant to antimicrobial agents. Therefore, the importance of alternative strategies particularly Homoeopathy is prominent. Thus reduces the incidence of urinary tract infections.

Materials and Methods

- 20 cases with clinical signs and symptoms of urinary tract infection from Govt. Homoeopathic Medical College, Thiruvananthapuram OPDs and IPDs based on inclusion and exclusion criteria were selected.
- Experimental, prospective, before and after study without control group.
- Data was collected according to pre-structured GHMCT case record
- Routine urine microscopy was done and thus estimated the urine epithelial and pus cells before giving medicines.
- Brief case taking was done for individual analysis and patients were given Homoeopathic medicines *Copaiva officinalis* and *Equisetum hyemale* of different potency based on symptom analysis.
- Each case then reviewed after 1 week and followed for a period of 1 month.
- Detection of any change in the wrong direction was immediately followed by change in potency or change in remedy, depending upon the response of the patient.
- General supportive care was also given to patients like plenty of water intake, dietary management etc.
- Follow up analysis, repetition, dosage was also done as per the directions of 5th and 6th edition of Organon of medicine.
- Estimation of urine epithelial and pus cells was done after treatment with *Copaiva officinalis* and *Equisetum*

hyemale.

- Later, comparison and data analysis were done by statistical tests.
- Ethical clearance was obtained from the ethical committee of GHMCT before the commencement of the research.

Inclusion Criteria

- Patients presenting signs and symptoms of UTI
- Patients having epithelial and pus cells in urine
- Females of reproductive age group
- Diabetic patients

Exclusion Criteria

- Patients under treatment for major systemic diseases like coronary artery disease, malignancy.
- Patients having chronic kidney disease, renal failure or nephrolithiasis.
- Infants and old aged persons.

Results

A sample of 20 cases attending the outpatient and inpatient department of Govt. Homoeopathic Medical College, Trivandrum were taken randomly for the study. All these cases were reviewed after 1 week and followed for a period of 1 months and were considered for statistical analysis. The results are presented on the basis of data obtained from the study group.

Table 1: Distribution of cases according to medicines

Medicine used	No of Cases
<i>Copaiva officinalis</i>	10
<i>Equisetum hyemale</i>	10

Interpretation

Out of 20 cases considered, Homoeopathic medicines *Copaiva officinalis* and *Equisetum hyemale* were given to 10 patients each based on clinical signs and symptoms.

Table 2: Distribution of cases according to age

Age	Number	Percentage
11 – 20	5	25
21 – 30	4	20
31 – 40	4	20
41 – 50	4	20
51 – 60	3	15

Interpretation

Out of 20 cases, 25% of people affected with UTI were in between 11-20 years of age, 20% were in between 21-30 years of age, 20% were in between 31-40 years of age, 20% were in between 31-40 years of age and rest 15% were in between 51-60 years of age.

Table 3: Distribution of cases according to gender

Gender	No of cases
Male	4
Female	16
Others	0

Interpretation

In 20 cases considered, 16 people affected with UTI were females and 4 were males.

Table 4: Distribution according to marital status

Marital status	No of cases	Percentage
Married	13	65
Unmarried	7	35

Interpretation

In 20 cases considered, 13 patients were found to be married and 7 were unmarried.

Table 5: Distribution of cases according to symptoms

Symptoms	No of cases
Dysuria	11
Frequency	7
Fever	2
Suprapubic pain	0
Low backache	0

Interpretation

In 20 cases considered, 11 patients were found to be suffering from dysuria, 7 were found to be suffering from increased frequency of urination and two of them found to be suffered from fever

Table 6: Comparison number of epithelial cells before and after treatment with *Copaiva officinalis*

Case	Before Treatment	After treatment
1	6	2
2	2	Nil
3	6	1
4	4	Nil
5	10	4
6	3	Nil
7	3	Nil
8	12	3
9	8	2
10	4	Nil

Interpretation

By analyzing the number of epithelial cells before and after treatment with *Copaiva officinalis*, a significant change in number of epithelial cells was noted.

Table 7: Comparison of pus cells before and after treatment with *Copaiva Officinalis*

Case	Before treatment	After treatment
1	4	2
2	12	3
3	10	2
4	Nil	Nil
5	2	Nil
6	20	3
7	5	1
8	6	2
9	14	4
10	5	Nil

Interpretation

By analyzing the number of pus cells before and after treatment with *Copaiva officinalis*, a significant change in number of pus cells was noted.

Table 8: Comparison of number of epithelial cells before and after treatment with *Equisetum hyemale*

Case	Before treatment	After treatment
1	3	1
2	12	4
3	8	2
4	2	Nil
5	20	4
6	6	2
7	6	2
8	4	Nil
9	3	Nil
10	10	2

Interpretation

By analyzing the number of epithelial cells before and after treatment with *Equisetum hyemale* (Table 8), a significant change in number of epithelial cells was noted

Table 9: Comparison of pus cells before and after treatment with *Equisetum hyemale*

Case	Before treatment	After treatment
1	8	2
2	3	2
3	Nil	Nil
4	10	3
5	10	2
6	2	2
7	5	1
8	2	Nil
9	8	3
10	2	Nil

Interpretation

By analyzing the number of pus cells before and after treatment with *Equisetum hyemale* (Table 9), a significant change in number of pus cells was noted.

Statistical Analysis and Interpretations

- For comparison of epithelial cells before and after treatment with *copaiva officinalis* the Shapiro-Wilk test of normality shows P-value 0.311 which is greater than 0.05 suggesting strong evidence of normality.
- Here the P value of Paired t-test is less than 0.001 which means significance difference is present between the values before and after treatment.
- For comparison of pus cells before and after treatment with *copaiva officinalis* the Shapiro-Wilk test of normality shows P-value 0.325 which is greater than 0.05 suggesting strong evidence of normality.
- Here the P value of Paired t-test is 0.004 which is less than 0.01, which means significance difference is present between the values before and after treatment.
- For comparison of epithelial cells before and after treatment with *Equisetum hyemale* the Shapiro-Wilk test of normality shows P-value 0.015 which is less than 0.05 suggesting evidence of non-normality
- Here the P value of Wilcoxon signed rank test is 0.005 which is less than 0.01, which means significance difference is present between the values before and after treatment.

- For comparison of pus cells before and after treatment with *Equisetum hyemale* the Shapiro-Wilk test of normality shows P-value 0.402 which is greater than 0.05 suggesting strong evidence of normality.
- Here the P value of Paired t-test is 0.004 which is less than 0.01, which means significance difference is present between the values before and after treatment.

Discussion

Urinary tract infections are one of the most common infections in worldwide, involving urethra, bladder, and kidney and are caused by Gram-negative bacteria, followed by Gram-positive bacteria or fungi. The most common uropathogen species are *Escherichia coli* and *Klebsiella*. The infection of bladder and urethra are referred to as the infection of lower urinary tract whereas the kidney and ureter infection is an indication of upper urinary tract infection. Clinically UTI, can be classified as uncomplicated or complicated based on the factor that triggers the infection [23]. Uncomplicated UTI mostly affects healthy individuals with no structural or neurological urinary tract abnormalities which includes cystitis and pyelonephritis [23]. Complicated UTI is due to the factors that compromise the urinary tract, which include urinary tract obstruction, neurological disease-causing urinary retention, renal failure, renal transplantation, pregnancy and the presence of foreign bodies such as calculi, indwelling catheters or other drainage diseases. It can be also classified as primary or recurrent depending on the nature of occurrence.

Urinary tract infection affects people from all age groups including neonate and geriatric age groups. It also affects peoples from both the genders. Although women of reproductive age group (15-44) are more vulnerable population to UTI.

Homoeopathy is a holistic medical practice that treats the patient as a whole [24]. Homoeopathic medicines are a useful alternative to conventional medication offering earlier symptom resolution, cost effectiveness and better quality of life. Urinary tract infection and their complications are mainly due to frequent antibiotic prescribing. In the light of antimicrobial resistance, Homoeopathy offers alternative strategies against the development of antibiotic resistance. So Homoeopathic system can provide remarkable results in the treatment of urinary tract infection. *Copaiva officinalis* and *Equisetum hyemale* are the two important homoeopathic remedy indicated in urinary tract infection.

Conclusion

Effectiveness of Homoeopathic medicines *Copaiva officinalis* and *Equisetum hyemale* in urinary tract infections is done by estimating urine epithelial and pus by doing routine urine microscopy. There is a significant change in quantity of the urine epithelial and pus cell before and after treatment with *Copaiva officinalis* and *Equisetum hyemale*. It is obvious from the tables given above. Thus, this study concludes Homoeopathic medicines *Copaiva officinalis* and *Equisetum hyemale* are effective in managing urinary tract infections.

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Conflict of Interest

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