



ISSN 2456-3110

Vol 8 · Issue 8

August 2023

Journal of
**Ayurveda and Integrated
Medical Sciences**

www.jaims.in

JAIMS

An International Journal for Researches in Ayurveda and Allied Sciences



Maharshi Charaka
Ayurveda

Indexed

Comparative study of clinical evaluation of Tab. *Bhumiamalaki Ghanavati* and Tab. Norfloxacin in the management of *Pittaja Mootrakruccha* w.s.r. to Urinary Tract Infection

Nikita Sanjay Nigal

Assistant Professor, Department of Kayachikitsa, COER Medical College of Ayurveda and Hospital, Roorkee, Uttarakhand, India.

ABSTRACT

Background: Prevalence and incidence of urinary tract infection (UTI) is higher, and caused by the invasion of microorganisms in the genitourinary tract. Most common causative organism is E-coli. Occurring commonly in females due to short urethra. UTI can be correlated with *Mootrakruccha* (dysuria) which is elaborated by *Acharya Charaka* in *Trimarmiya Chikitsa Adhyaya*. *Pittaja Mootrakruccha* occurs due to vitiation of *Pitta Dosha*, mostly seen in patients receiving *Pitta Prakopaka Ahara* and *Vihara*. Common symptoms are *Sadaha* (burning), *Sashula* (painful) and *Muhurmuhu* (frequency) *Mootrapravritti* (micturation). **Aim:** To do comparative study of clinical evaluation of *Bhumiamalaki Ghanavati* and Tab. Norfloxacin in the management of *Pittaja Mootrakruccha* w.s.r. to UTI. **Materials & Methods:** In this study, 60 patients were equally divided by simple random sampling method into Group A administered with *Bhumiamalaki Ghanavati* (250mg-2 BD) having cooling, antispasmodic, analgesic property and Tab. Norfloxacin (400mg - BD) to Group B for 10 days, respectively. The primary outcomes were measured by chi-square test and run test for interpretation of subjective and objective criteria. **Observation and Results:** Findings of 30 patients in each group revealed that in group A, relief of 63.63%, 65% and 56.86% was observed in *Sadaha*, *Sashula* and *Muhurmuhu Mootrapravritti* complaint, respectively. **Conclusion:** Administration of *Bhumiamalaki Ghanavati* shows significant improvement on subjective and objective criteria.

Key words: *Pittaja Mootrakruccha*, *Bhumiamalaki Ghanavati*, *Urinary Tract Infection*, *Sadaha Mootrapravritti*, *Sashula Mootrapravritti*.

INTRODUCTION

Urinary tract infection is disorder of urogenital system in which multiplication of organisms is seen in urinary tract. It is second most common infection in human.^[1] It has been reported that more than 150 million people are affected by UTI globally and it accounts approximately 35% of all nosocomial infection and also been estimated that the implication of E. coli in UTI

infection is about 80-85%.^[2] Women are more prone to UTI than men due to short urethra due to which the invasion of bacteria in urinary tract is easy. Retrograde ascent of bacteria from the perineum is the most common cause of acute cystitis in women.^[1] There are some other causes like certain medications, consumption of alcohol, tropical climate, lack of water intake; unhygienic lifestyle etc. 40-50% of women will suffer from UTI at least once during their lifetime.^[2] It affects daily activities and also has an impact on physical and mental health of the person. In contemporary, medicine choice of treatment is antibiotics. Due to lack of awareness about treatment and high cost, patients don't take treatment properly. Hence in modern times, there is an increasing resistance to antibiotics, chances of reinfection and relapse even after long term therapy is seen. Acute UTI is one of the most important causes of morbidity, occasionally becoming life threatening, forcing the general population to seek medical attention, and accounting for considerable health care costs. It may

Address for correspondence:

Dr. Nikita Sanjay Nigal

Assistant Professor, Department of Kayachikitsa, COER Medical College of Ayurveda and Hospital, Roorkee, Uttarakhand, India.

E-mail: nikita01nigal@gmail.com

Submission Date: 05/06/2023 Accepted Date: 16/07/2023

Access this article online

Quick Response Code



Website: www.jaims.in

DOI: 10.21760/jaims.8.8.2

lead to many serious conditions like chronic pyelonephritis, chronic renal failure etc. Common symptoms of UTI are Burning micturation, Painful micturation, and abdominal pain.^[3] Being undergone such a challenging situation regarding UTI, there is a necessity of continuous searching for a good and cost effective treatment modalities. On the basis of its sign and symptoms, UTI can be correlated with *Mootrakruccha* (Dysuria) in *Ayurveda*, which means difficulty in micturation. *Acharya Charaka* described this disease elaborately in *Trimarmiya Chikitsa Adhyaya* (management of disease of the 3 vital organs).^[4] In particular, it resembles with *Pittaja Mootrakruccha*, in which vitiated *Pitta* (heat) along with *Vata* (air) localized in *Basti* (bladder) and affects *Mootravaha Strotas* (channel carrying urine). *Sadaha Mootrapravritti* (Burning micturation), *Sashula Mootrapravritti* (pain during micturation), *Alpa Varanvar Mootrapravritti* (frequency of micturation) are cardinal symptoms of *Pittaja Mootrakruccha*.^[5] It is caused by *Pittakara Ahara Vihara*, *Ativayam* (Excessive physical exertion), *Teekshna Aushadha* (intake of drugs having sharp quality), *Atimadyapana* (habitual intake of alcohol), *Adhyashana* (food intake before digestion of previous food), *Ajirhashana* (chronic indigestion).^[4] *Ayurveda* have both curative and preventive treatment for it.

Hence, in this study *Bhumiamalaki Ghanavati* was selected for the treatment of *Mootrakruccha*. *Ghanavati* (semisolid form of *Kwatha*) is a secondary form of *Kwatha* (decoction).^[6] Which is easily available and also cost effective. Its shelf life period is 2yrs and consumption is convenient for patient.^[7,9] *Bhumiamalaki* (*Phyllanthus urinaria* Linn.) belongs to Euphorbiaceae family. It has *Mootral* (diuretic property) so it is named as *urinaria*. It is mainly used in liver diseases, diabetes, jaundice, gonorrhoea, intestinal infection, UTI.^[10] *Bhumiamalaki* is described by *Charaka* under *Shwashara* and *Kasahara Gana*. *Tikta* (bitter), *Kashaya* (astringent), *Madhura* (sweet) *Rasa* (taste), *Madhura* (sweet) in *Vipaka* (post digestive effect), *Sheeta Virya* (cool in potency) having *Vatapittashamaka* (alleviates *Vata* and *Pitta Doshas*) property.^[11] This herb is known to pacify the

aggravated *Vata Dosha* and treat numerous *Vata*-related diseases. *Bhumiamalaki* is also used in pacifying *Pitta* and *Kapha Doshas*, thus acts as *Vedanasthapana* (relieving pain) and *Dahashamaka* (relieving burning sensations) caused due to the aggravation of these two *Doshas*. It is easily available and cheap drug, palatable to all age group and thus fulfilling all criteria of *Uttam Bhashaja* (good medicine). Taking all the points into consideration, attempts have been made in the present work to provide better alternative diagnosis to the problem. In this study 60 patients were selected and randomly divided into 2 groups equally. *Bhumiamalaki Ghanavati* was administered to Group A and Tab. Norflox in group B for 10 days. In the present study, an attempt has been made to find an inexpensive and effective treatment of *Pittaja Mootrakruccha* (UTI).

AIM

Comparative study of clinical evaluation of *Bhumiamalaki Ghanavati* and Tab Norfloxacin in the management of *Pittaja Mootrakruccha* w.s.r. to Urinary Tract Infection.

OBJECTIVES

1. To study the *Mootrakruccha* (Dysuria) *Vyadhi* (Disease) and Urinary Tract Infection in detail.
2. To review the plant *Bhumiamalaki* (*Phyllanthus urinaria* Linn.) in detail.
3. To study the relief in the symptoms of *Pittaja Mootrakruccha* such as; *Sadaha Mootrapravritti* (Burning micturation), *Sashula Mootrapravritti* (pain during micturation), *Muhurmuhu Mootrapravritti* (frequency of micturation).

MATERIALS AND METHODS

Ethics

The study was approved by institutional ethical committee and MUHS (Maharashtra University of health science) on 17/3/2016. Prior informed written consent was obtained from each patient including in the study.

Design

A prospective, randomized, single blind, controlled clinical trial was conducted on 60 patients. Simple random sampling method used for selection of patient.

Diagnostic criteria

A total of 63 patients having symptoms of *Mootrakruccha* (Dysuria) were selected from OPD and IPD of Ayurveda Seva Sangh hospital, Nashik irrespective of sex, religion, economical status, education, and occupation. Among them 3 patients were dropped out. Thus, 60 patients were studied in the present investigation. A detailed clinical research proforma, incorporating all the points of history taking, examination and treatment was recorded for analysis.

A) Inclusion criteria

Cases were randomly selected irrespective of their sex, occupation and socio-economic conditions, showing the following signs and symptoms of *Pittaja Mootrakruccha*; i.e., *Sadaha Mootrapravritti* (Burning micturation), *Sarakta Mootrapravritti* (Hematuria), *Sashula Mootrapravritti* (Painful micturation), *Muhurmuhu Mootrapravritti* (Frequency of micturation), *Sheetpurvaka Jwara* (Fever with or without chills). Patients with age group between 20-60 years and having Pus cells with or without RBC on Urine Examination were studied.

B) Exclusion criteria

Patients with Diabetes Mellitus, Immune compromised patient, Urinary Tract malignancy, Renal Calculi, Renal failure, Renal abscess, Pregnancy, Azotemia, Oligouria, CAUTI (Catheter associated UTI).

Drug administration details**Grouping and Posology**

Randomly selected 60 patients were equally divided into 2 groups. As this was single blind randomized study here 30 patients were treated by drug Tab. *Bhumiamalaki Ghana* while the remaining 30 patients were treated by Tab. Norfloxacin.

Trial drug and procedure details of *Bhumiamalaki Ghanavati*

Content - *Bhumiamalaki*

Latin name - *Phyllanthus urinaria* Linn.

Family - Euphorbiaceae

Rasa - Tikta, Kashaya, Madhura

Vipaka - Madhura

Veerya - Sheeta

Method of preparation of *Bhumiamalaki Ghanavati*

Bhumiamalaki Panchanga (all parts) was taken as a raw drug procured from GMP - certified pharmacy (Chaitanya Pharmacy, Nashik, Maharashtra) was boiled with sixteen parts of water and reduced upto one eighth. *Kwatha* (decoction) was separated with the help of centrifuge machine, and then boiled back again for 8-12 hrs, until reduced to semi solid followed by drying at 60-70 degree using a vacuum tray dryer with the help of water bath. Coarse powder particles were prepared from dried *Kwatha* (decoction), which were later converted to granules with the help of multi mili instrument. No binding agent was used during this procedure. Finally, tablets were prepared using rotary tablet making machine. Thus, black color *Bhumiamalaki Ghanavati* is ready. Hardness and disintegration time observed.^[6,9]

Group A (experimental group)

30 Patients treated with *Bhumiamalaki Ghanavati*

Matra (quantity): 2 tabs (500 mg) 2 times a day

Anupana (vehicle): *Shrutsheet Jala* (lukewarm water)

Aushadha Sevan Kala (Time of drug administration): *Apankala* (before meal)

Duration: 10 days

Group B (control group)

30 Patients treated with Tab. Norfloxacin

Matra (quantity): 1 tab (400 mg) 2 times a day

Anupana (vehicle): *Shrutsheet Jala* (lukewarm water)

Aushadha Sevan Kala (Time of drug administration): *Paschatbhaktha* (after meal)

Duration: 10 days.

Investigation

Hematological examination (Hb%, TLC, DLC and ESR), Urine routine and microscopic examination were carried out before and after treatment.

Criteria for assessment of result

The efficacy of the therapy was assessed on the basis of subjective and objective criteria.

Subjective criteria: Improvement in sign and symptoms obtained in the patient were considered for the assessment.

Table 1: Subjective criteria for assessment

Score	1. <i>Sadaha Mootrapravritti</i> (Burning Micturation)
0	Absent
1	Burning only during micturation
2	Burning persist upto 1 hour after micturation
3	Burning continuous even after 1 hour
Score	2. <i>Sashula Mootrapravritti</i> (Painful Micturation)
0	Absent pain
1	Pain at the time of micturation
2	Pain persistent upto 1 hour after micturation
3	Pain persistent and not relieved even after 1 hour
Score	3. <i>Muhurmuhu Mootrapravritti</i> (Frequency of Micturation)
0	1-5 times/day
1	6-10 times/day
2	11-15 times/day
3	More than 15 times/day

Objective criteria**Table 2: Objective criteria for assessment**

Score	1. <i>Sheetpurvak Jwara</i> (Fever)
0	Normal Body temp
1	Body temp. 99-100°f
2	Body temp. 101-102°f
3	Body temp. >102°f

Score	2. No. of pus cells
0	0-5/hpf
1	6-10/hpf
2	11-15/hpf
3	15/hpf & more
Score	3. <i>Sarakta Mootrapravritti</i> (Hematuria)
0	Below 5RBC/hpf
1	6-10 RBC/hpf
2	11-15 RBC/hpf
3	>15 RBC/hpf

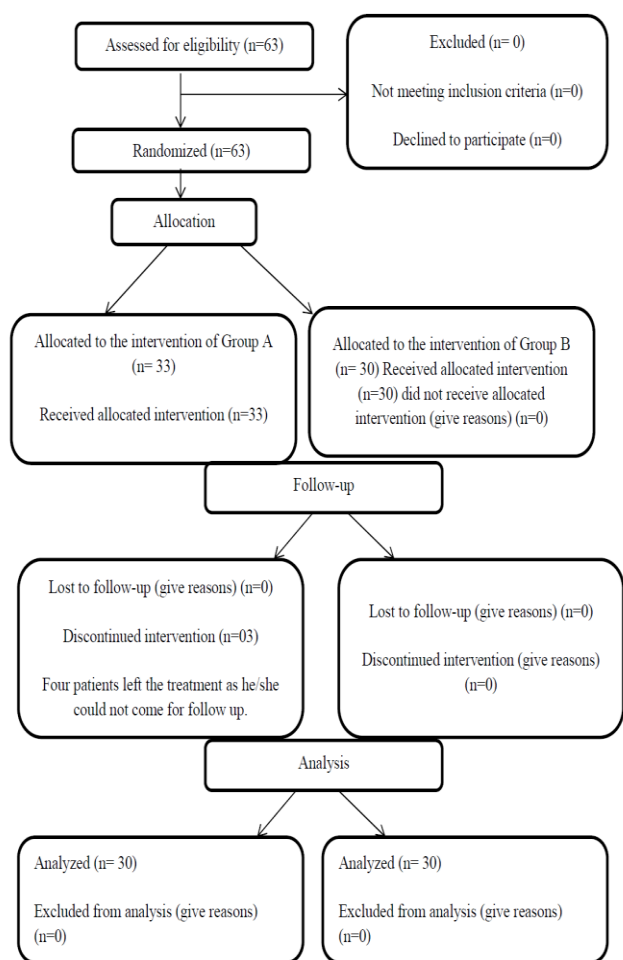
Statistical Analysis

Statistical analysis was done for the interpretation of the observation. Total 60 patients were enrolled for the study in Case Proforma for regular follow-up and separate criteria was prepared for their assessment. The data was analyzed with the help of 'Chi-square test for subjective and objective criteria', Run test was used for *Sarakta Mootrapravritti* (Hematuria) criteria before and after treatment'. The obtained results were interpreted as:

Not significant: $P > 0.05$, Significant: $P < 0.05$

OBSERVATION

Patient for the present clinical trial were registered between the periods of June 2016 to May 2017. After 1 year of the clinical study, registration of the patients was closed having to submit the thesis work to the institute. A total of 60 patients were registered for the present study and were randomly divided into two groups to evaluate the *Bhumiamalaki Ghanavati* and Tab. Norfloxacin in the management of *Pittaja Mootrakruccha*. 60 patients completed the treatment successfully. In this trial, 30 patients were allocated to group A and 30 patients were allocated to Group B. 30 patients in each group could complete the course of treatment, while 03 patients in Group A could not complete the treatment and follow-up. [Flow chart 1]



Flow chart 1: CONSORT flow diagram

In the present study, a maximum of 61.66% of patients were in age group 41-60 years, of which 65% of the patients were female, 90% were married, 21.66% of patients were found to be housewife, 66.66% of patients were found to be literate, 55% of patients were having mixed diet, and 46.66% patients were having *Kaphaja Pittaja Prakriti* (constitution).

RESULT

In the present clinical study, *Sadaha Mootrapravritti* (Burning Micturation), *Sashula Mootrapravritti* (Painful Micturation), *Muhurmuhu Mootrapravritti* (Frequency of Micturation) symptom, *Sheetpurvaka Jwara* (fever), pus cells in urine and *Sarakta Mootrapravritti* (hematuria) symptom was reduced to 63.63% and 65%; 56.86% and 43.90%; 73.21% and 76.78%; 84% and 77.27%; 84% and 77.27% and 95.23% and 90.56% in Group A and Group B, respectively.

In this study, the numbers of patients showing the symptom *Sarakta Mootrapravritti* (hematuria) was very less as many factors which cause hematuria were excluded. Thus, a non-parametric Run test was applied for these criteria. According to this test, both groups reduced *Sarakta Mootrapravritti* (hematuria) but there is no significant difference in result by comparing these two groups. In Subjective criteria, a significant difference was observed on *Sadaha mootrapravritti* (Burning Micturation), *Sashula Mootrapravritti* (Painful Micturation) while in Objective criteria, a significant difference was observed on *Sheetpurvaka Jwara* (fever), Pus cells and *Sarakta Mootrapravritti* (hematuria) while no significant difference was observed on *Muhurmuhu Mootrapravritti* (Frequency of Micturation). Overall effect of therapy in both the groups are as shown in Graph 1. After studying all the data thoroughly, it was observed that out of 30 patients of group A, 14 patients (46.66%) received complete relief, 12 patients (40%) received moderate relief, and 4 patients (13.33%) received mild relief and 0 patient shows unchanged. Where as in control group, 11 (36.66%) patient’s received complete relief, 15 (50%) received moderate relief and 4 (13.33%) received mild relief and 0 patient shows unchanged. No adverse drug reaction was observed in any groups throughout the study period.

Effect of therapy on sign and symptoms

Table 3: Effect of therapy on subjective criteria Gr. A vs. Gr. B

Chief complaint	X ²		df		Table X ² value		Probability	Significance	
	D0	D11	D0	D11	D0	D11		D0	D11
<i>Sadaha Mootrapravritti</i>	4.64	6.22	1	1	3.84	3.84	<0.05	Significant	Significant
<i>Sashula Mootrapravritti</i>	0.04	7.84	1	2	3.84	5.99	<0.05	Not Significant	Significant

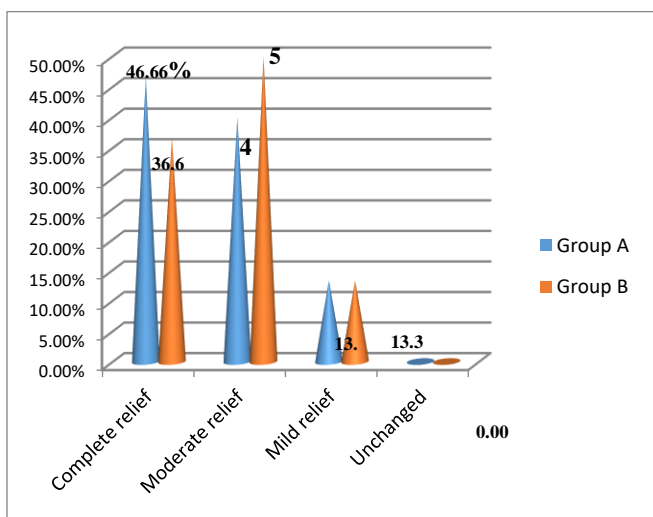
Muhur muhu Mootra pravritti	0.26	3.74	1	1	3.84	3.84	<0.05	Not Significant	Significant
-----------------------------	------	------	---	---	------	------	-------	-----------------	-------------

Table 4: Effect of therapy on objective criteria Gr. A vs. Gr. B

Chief complaint	X ²		df		Table X ² value		Probability	Significance	
	D0	D11	D0	D11	D0	D11		D0	D11
Sheet purvka Jwara	0.28	5.16	1	1	3.84	3.84	<0.05	Not Significant	Significant
Pus cells in urine	9.12	5.06	2	1	5.99	3.84	<0.05	Significant	Significant

Table 5: Effect of therapy on Sarakta Mootrapravritti (Hematuria) criteria Gr. A vs. Gr. B

Sarakta Mootrapravritti (Hematuria)	Group	n	SD	P	Result
	A	7	1.898	<0.05	Significant
	B	4	1.191	<0.05	Significant



Graph 1: Distribution of patients according to Overall effect of Therapy

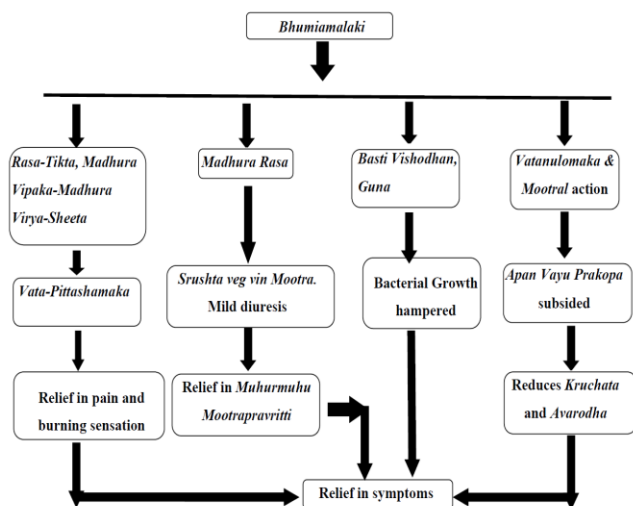
DISCUSSION

Trial drug i.e., Group A (*Bhumiamalaki Ghanavati*) is effective in the treatment of *Pittaja Mootrakruccha*. 61.66% patient was between 41-60yrs of age; which is *Pittapradhan Dosha Avastha* (*Pitta* dominance condition). 55% of patient had mixed diet, non-veg aggravates *Pitta*, which is another important factor in pathogenesis of *Mootrakruccha* (*Dysuria*). The efficacy of *Bhumiamalaki Ghanavati* on the *Vyadhi* (*disease*) *Mootrakruccha* (*Dysuria*) needs to be explored more. During the study, there was no evidence of any adverse reaction. The study was carried out for short period of time and on small sample size. So, the topic is open for further study on large number of subjects and for a long duration - for observing and preventing recurrence.

Probable mode of action of drug

Bhumiamalaki Ghana has *Vaatpittashamaka* (alleviates *Pitta* and *Vata*) property. *Tikta Rasa* (bitter taste) *Kashaya* (astringent), *Madhura Rasa* (sweet taste), *Madhura Vipaka* (post digestive effect) & *Sheeta Veerya* (cool in potency), thus acts as *Dahashamaka* (relives burning sensation). *Tikta Rasa* (bitter taste), *Kashaya Rasa* (astringent taste), *Laghu* (lightness), and *Ruksha Guna* (unctuousness) and have the properties of *Vedanasthapana* (analgesic).^[11] The *Madhura Rasa* has property of *Srushta-Vega-Vinmootrata*, hence proves to possess mild diuretic action. So, relief in *Muhurmuhu Mootrapravritti*.^[12] It has *Vatanulomaka* & *Mootrala* properties, due to all these, it subsides *Apana Vayu Prakopa* which is useful to reduce *Kruchhrata* (difficulty) and *Avarodha* (obstruction). *Tikta* (bitter taste) and *Kashaya Rasa Pradhana* (astringent taste dominant), both of which are *Pitta Kaphahara* (alleviates *Pitta* and *Kapha*) *Laghu* (lightness), and *Ruksha Guna* (heat). Thus, acts as *Kleda Shoshaka* (absorbs putrefaction). The bacterial growth is hampered which may be due to its '*Basti Visodhana Gunas*' and mild diuresis.^[12] Hence *Bhumiamalaki* is useful in the natural phenomenon of urinary secretion and abolishes the symptoms of *Dysuria*, suppression of urine, pain, fever and dribbling due to bacteriuria.

Bhumiamalaki has antimicrobial property against gram +ve & gram -ve bacteria. This plant was able to control the growth of *Escherichia coli*, *Enterococcus faecium*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Mycobacterium smegmatis*.^[13,14] Its biomarkers phyllanthin and hypophyllanthin were able to modulate the innate response to phagocytes. Leaves and stem contain alkaloids phyllanthoside with strong anti-spasmodic activity which helps in relieving pain.^[10] These isolate from *Phyllanthus Urinaria* Linn. may be useful for the treatment of cell-mediated immune disease and acts as anti-inflammatory action also.^[15] This drug is diuretic to a great extent and thus concentrates in urinary system; it does not disturb the bacterial flora of bowel and is well tolerated by the most of the patients. Hence *Bhumiamalaki* (*Phyllanthus urinaria* Linn.) acts on urinary systems and relieves the symptoms of *Pittaja Mootrakruccha* i.e., UTI.



Flow chart 2: Probable mode of action of *Bhumiamalaki* on *Pittaja Mootrakruccha*

Safety of trial drugs

No adverse effect of drugs was observed during the entire clinical trial.

CONCLUSION

On the basis of clinical trial conducted for the study. It can be interfered that in this study trial group i.e., *Tab. Bhumiamalaki Ghanavati* was showing safe and better results in *Pittaja Mootrakruccha* (UTI).

ACKNOWLEDGEMENT

The authors are very thankful to the authority of Institute, for their support.

REFERENCES

1. Yadav M, Pal R, Damrolien S, Khumanthem SD. Microbial spectrum of urinary tract infections and its antibiogram in a tertiary care hospital. *Int J Res Med Sci* [Internet]. 2017 May 27 [cited 2023 Jul. 17]; 5(6):2718-22.
2. Foxman B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. *Am J Med*. 2002; 113 Suppl 1A:5S-13S. doi: 10.1016/s0002-9343(02)01054-9
3. Kalpana gupta, Barbara w. Trautner Urinary Tract infection In: Dennis Kasper, editor. *Harrison's Principles of Internal Medicine*, 19th ed. USA: McGraw-Hill; 2015.p. 861-68 4.
4. Shashirekha H.K., Bargale Sushant Sukumar, Charak Samhita, Chikitsa sthana; Trimarmiya Chikitsa Adhyaya: chapter 26,32-44,1st ed, Chaukhambha publication, New Delhi2020;p 453-59
5. Vasant Patil, Rajeshwari N.M., *Susruta Samhita Of Maharsi Susruta, Uttartantra; mutrakrcchra pratisedham adhyaya: chapter 59,3-14,1st ed, Chaukhambha Publication, Varanasi,2018; p 466-67.*
6. Brahmanad Tripathi, *Sharangdhar Samhita, madhyamkhanda; chapter 2nd,1-2, Chaukhambha publication Varanasi,2017;p 90.*
7. Brahmanad Tripathi, *Sharangdhar Samhita, madhyamkhanda; chapter 8th, 1, Chaukhambha publication, Varanasi, 2017; p 139.*
8. Ravindra Angadi, Bhasajya Kalpana Vijnanam, Ed 2011, Chaukhambha Surabharati Prakashan, Varanasi 2011; p.123
9. Apeksha D. Patil, Dhiraj B. Patil, Sagar V. Ital. *Comparative Pharmaceutico - Analytical Study of Kushthaghna Mahakashaya and its Ghanavati w.s.r. to evaluate its shelf life. J Ayurveda Integr Med Sci* 2017; 4:80-85.
10. Geethangili M and Ding S-T (2018) A Review of the Phytochemistry and Pharmacology of *Phyllanthus urinaria* L. *Front. Pharmacol.* 9:1109. doi: 10.3389/fphar.2018.01109

11. Pandit Narahari, Rajanigantu, Parpatadivarga ,7th chapter,61-63, edited by Dr.Indradeva tripathi,6th edition, Chaukhambha Krishnadas Academy, Varanasi,2016;p123.

12. Ayurvedic pharmacopoeia of India, part-1, volume -1, page no111

13. Lai CH, Fang SH, Rao YK, et al. Inhibition of Helicobacter pylori-induced inflammation in human gastric epithelial AGS cells by Phyllanthus urinaria extracts. J Ethnopharmacol. 2008; 118(3):522-526. doi:10.1016/j.jep.2008.05.022

14. Dabur R, Gupta A, Mandal TK, et al. Antimicrobial activity of some Indian medicinal plants. Afr J Tradit Complement Altern Med. 2007; 4(3):313-318. Published 2007 Feb 16. doi:10.4314/ajtcam.v4i3.31225

15. Fang SH, Rao YK, Tzeng YM. Anti-oxidant and inflammatory mediator's growth inhibitory effects of compounds isolated from Phyllanthus urinaria. J Ethnopharmacol. 2008; 116(2):333-340. doi:10.1016/j.jep.2007.11.040.

How to cite this article: Nikita Sanjay Nigal. Comparative study of clinical evaluation of Tab. Bhumiamalaki Ghanavati and Tab. Norfloxacin in the management of Pittaja Mootrakruccha w.s.r. to Urinary Tract Infection. J Ayurveda Integr Med Sci 2023;08:7-14. <http://dx.doi.org/10.21760/jaims.8.8.2>

Source of Support: Nil, **Conflict of Interest:** None declared.
