AYUSHDHARA
ISSN: 2393-9583 (P)/ 2393-9591 (O)
An International Journal of Research in AYUSH and Allied Systems

Research Article

A CLINICAL STUDY TO EVALUATE THE EFFECT OF *GOKSHURU KWATHA* IN THE MANAGEMENT OF *MUTRAKRICHRA* W.S.R. TO URINARY TRACT INFECTION

Neelam Singh[1]*, Manik Soni[2], Sunil Thakur[3], Swapnil Saini[4]

*[1]MD Scholar, [2]Sr. Lecturer, [3]Professor, PG Dept. of Kayachikitsa, [4]Reader, PG Dept. of Roga Nidana, R.G.G.P.G. Ayurvedic College & Hospital, Paprola, Dist. Kangra (H.P.), India.

Article info

Article History:
Received: 05-10-2024
Accepted: 25-10-2024
Published: 20-11-2024

KEYWORDS:
Ayurveda, Gokshuru Kwatha, Mutrakrichra, Urinary Tract Infection.

ABSTRACT

Urinary tract infections are the most common infections, after respiratory tract infections. 40-50% females suffer from UTI at least once in their life time. Although, modern medical system has many drugs to manage UTI but there are limitations. The use of antibiotics have side effects. Chances of re-infection and relapse even after long term therapy. Increasing incidence of resistance and high cost of therapy are common problems. In Ayurvedic texts, many herbal drugs have been mentioned for the treatment of *Mutrakrichra*. So, this study was planned to evaluate the safety and efficacy of herbal drug in the management of *Mutrakrichra* w.s.r. U.T.I. The goal of this study was to find an effective, well accepted drug with minimal or no complications and no side effects. A total number of 60 patients, who were diagnosed with *Mutrakrichra* w.s.r. to Urinary Tract Infection were randomly divided into two groups - Group I and Group II- consisting of 30 patients each. The trial drug i.e., *Gokshuru Kwatha* was given in the dose of 40ml twice a day to 30 patients of Group I, whereas, the standard drug i.e., Tablet Norfloxacin 400mg twice a day was given to 30 patients of Group II, for a duration of 1 week. The effect of therapy was assessed on the basis of subjective parameters, before and after the completion of the trial and the data obtained during the trial was then statistically analyzed.

INTRODUCTION

UTIs are a serious public health issue caused by a variety of pathogens, with *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterococcus faecalis*, and *Staphylococcus saprophyticus* being the most common culprits.[1]

The term "urinary tract" encompasses the ureters, urinary bladder, and urethra. Its primary function is to transport urine from the renal pelvis to the bladder, store it in the bladder, and excrete it through the urethra, while also preventing the backward flow of urine.[2]

The distal urethra is normally colonized by bacteria, but their ascent and the development of a UTI are prevented by urine dilution, periodic voiding, mucosal defence mechanisms, and a competent anti-reflux mechanism at the ureterovesical junction.[3]

UTI is defined as significant bacteriuria accompanied by either lower or upper urinary symptoms with related clinical pathological consequences.[4] Infections of the urethra and bladder are often considered superficial (mucosal) infections, while conditions like prostatitis, pyelonephritis, and renal suppuration indicate tissue invasion.[5]

From a microbiological standpoint, a UTI is present when pathogenic microorganisms are detected in the urine, urethra, bladder, kidney, or prostate.[6] Typically, a growth of more than 105 organisms per millilitre from a properly collected midstream "clean catch" urine sample indicates infection.

However, significant bacteriuria might be absent in some true UTI cases, particularly in symptomatic patients, where even smaller bacterial counts (102 to 104/ml) can signify infection.[7] In urine specimens obtained through suprapubic aspiration or catheterization, bacterial counts of 102 to 104/ml

Access this article online

Quick Response Code

https://doi.org/10.47070/ayushdhara.v11i5.1775

usually indicate infection. Conversely, colony counts exceeding 105/ml of midstream urine can sometimes result from specimen contamination, especially when multiple species are present.[8]

Recurrent infections after antibiotic therapy may be due to the persistence of the original strain or re-infection with a new strain. Recurrent infections caused by the same strain that emerge within two weeks of stopping therapy may result from unresolved renal or prostatic infections or from persistent vaginal or intestinal reservoirs leading to rapid re-infection of the bladder.[9]

Clinically, UTIs are categorized as uncomplicated or complicated. Uncomplicated UTIs typically occur in healthy individuals with no structural or neurological urinary tract abnormalities and are divided into lower UTIs (cystitis) and upper UTIs (pyelonephritis). Several risk factors are associated with cystitis, including female gender, a prior UTI, sexual activity, vaginal infection, diabetes, obesity, and genetic predisposition.[10]

Complicated UTIs are defined as those associated with factors that compromise the urinary tract or host defence mechanisms, including urinary obstruction, urinary retention due to neurological disease, immunosuppression, renal failure, renal transplantation, pregnancy, and the presence of foreign bodies like calculi, indwelling catheters, or other drainage devices.[11]

Catheter-associated UTIs (CAUTIs) are linked to increased morbidity and mortality and are the most common cause of secondary bloodstream infections. Risk factors for developing a CAUTI include prolonged catheterization, female gender, older age, and diabetes.[12]

Mutrakrichha is a disorder of *Mutravaha Srotas*. In classical Ayurvedic texts, *Charak Samhita* and *Sushurut Samhita have* described various types of urinary disorders i.e. eight types of *Mutrakrichra*,[13] thirteen types of *Mutraghatas,*[14] four types of *Ashmaris*[15] and twenty types of *Prameha* were described by *Ashtanga Hridaya*. *Mutrarogas* are classified into two major types i.e., *Mutra-Apravrtijanya* and *Mutra-Atipravrtijanya* disorders. *Mutrakṛichra* comes under *Mutra-Apravrtijanya* disorders[16]. *Madhava Nidana* has mentioned that *Krichhta* and *Mutraghata* by *Vibandhata* are present in *Mutrakṛichra* but *Vijaya Rakṣhita* in his commentary *Madhu-Kosha* on *Madhav Nidana* has cleared this controversy by citing that both the features are found in *Mutrakṛichra* but *Kṛichra* predominates[17].

AIMS AND OBJECTIVES

Primary Objectives

- To evaluate the efficacy of *Gokshuru Kwatha* in the management of *Mutrakrichra* w.s.r. to Urinary Tract Infection.
- To compare the efficacy of *Gokshuru Kwatha* with Tab Norfloxacin in the management of *Mutrakrichra* w.s.r. to Urinary Tract Infection.

Secondary Objective

- To assess the clinical safety of *Gokshuru Kwatha* in the patients of *Mutrakrichra* w.s.r. to Urinary Tract Infection.

MATERIAL & METHODS

Selection of Patients

1) The patients were selected from the O.P.D. and I.P.D. of Kayachikitsa deptt. of R.G.G.P.G. Ayurvedic College and Hospital Paprola, Dist. Kangra (H.P.).
2) Total 60 patients having sign and symptoms suggestive of *Mutrakrichra*/Urinary Tract Infections were registered and randomly divided into two groups (Group I-30 and Group II- 30).

Study design- Randomized clinical trial

Masking- Single blind

Timing- Prospective

Study Subjects- 60

No. of group- 2

Duration of trial- 1 week

Follow up visit- After one week i.e., the completion of trial.

Diagnostic criteria

Subjective criteria

The patients were diagnosed on the basis of

1. Clinical signs and symptoms as described in classical texts - *Sarakta Mutrata, Saruja Mutrata, Sadaha Mutrata, Krichra Mutrata, Muhur Muhar Mutrata, Peeta Mutrata.*
2. Clinical signs and symptoms as described in modern literature - Haematuria, Painful micturition, Burning micturition, Difficulty during micturition, Increased frequency of micturition.

Objective Criteria

Urine microscopy showing pus cells > 5/hpf in females and >3 /hpf in males AND / OR Presence of microorganism in urine culture.

Inclusion Criteria

1. Patients who presented with sign and symptoms of *Mutrakrichra* w.s.r. to U.T.I.
2. Patients of either sex in the age group of 18 -70 yrs.
3. Patients willing for trial and having no serious organic or metabolic ailments requiring immediate medical/surgical intervention.

Exclusion Criteria

Following criteria was set to exclude the individuals from trial:

1. Patients below the age of 18 yrs and above the age of 70 yrs.
2. Patients not willing for trial.
3. Patient with chronic kidney disease, diabetes mallitus, uncontrolled hypertension malignancy, T.B. of urinary tract.
4. Case associated obstructed uropathy and suffering from serious chronic illness.
5. Pregnant and lactating women.

Assessment criteria

Objective criteria

Investigation

Urine Examination

a. Routine
b. Microscopic
c. Urine culture

Biochemical investigations

FBS, S. Creatinine, B. Urea, SGOT, SGPT

Haematological

CBC, ESR

Composition

Table 1: Interventional Product details

Ingredients	Botanical Name	Family	Parts used	Form
Gokshura	*Tribulus terrestris* (Linn.)	Zygophyllaceae	Fruit	Coarse powder
Yavkhar	*Hordeum valgare* (Linn.)	Poaceae	Whole plant	*Kshar*

Drug Dose: 40ml *Kwatha* with 1.5g *Yavakshar* twice daily.

40gm coarse powder of *Gokshura* boiled in 4 times of water i.e., 160ml and reduced to 40ml.

1.5g of *Yavakshar* was added in 40ml *Gokshuru kwatha.*

Duration of trial- One week

Route of administration- Oral

Grading of Signs and Symptoms

- Grading system was adopted for the assessment of subjective parameters.
- Scoring of signs and symptoms as per grading was done according to the severity.

The grading of subjective parameters is as follows:

***Sadaha Mutrata* (Burning micturition)**

Grade 0- No burning micturition

Grade 1- Burning only at the start of micturition

Grade 2- Burning throughout the act of micturition.

Grade 3- Intolerable and prolonged burning throughout the act of micturition.

Subjective Criteria

It includes sign and symptoms described in Ayurvedic texts, and which are:

Sarakta Mutrata- Haematuria

Saruja Mutrata - Painful micturition

Sadaha Mutrata- Burning micturition

Krichra Mutrata- Difficulty during micturition

Muhur Muhur Mutrata- Increased frequency of micturition.

Pita Mutrata- Turbid/pale/yellow

Grouping of the Patients

Grouping of patients study subjects were randomized in to following two groups.

Group I: 30 patients were given *Gokshuru kwatha* 40ml with 1.5g *Yavakshar* twice daily.

Group II: 30 Patients were given Tab Norfloxacin 400mg twice daily.

Trial drug

The efficacy of *Gokshuru kwatha* was assessed in the clinical study and the detail of drug is as follows:

Goksuru Kwatha

क्वाथो गोक्षुरबीजानां यवाक्षारयुतःसदा।
मूत्रकृच्छं शकृज्जातं पीतः शीघ्रं निवारयेत्। (यो.र.उ./मू.कृ.चि.)

***Krichra Mutrata* (Difficulty in micturition)**

Grade 0- No difficulty

Grade 1- Difficulty at the beginning of the act.

Grade 2- Partial difficulty throughout during the act.

Grade 3- Intolarable difficulty throughout the act of micturition.

***Saruja Mutrata* (Dysuria)**

Grade 0- No pain.

Grade 1- Slight pain which patient notices occasionally.

Grade 2- Continuous and annoying pain during the complete act of micturition.

Grade 3- Continuous and intolerable pain during the complete act of micturition.

***Peeta Mutrata* (Yellowish discolouration of urine)**

Grade 0– Straw colour

Grade 1- Lemon yellow colour

Grade 2- Dark yellow colour

Grade 3- Mustard yellow colour

***Sarakta Mutrata* (Hematuria)**

Grade 0- Straw colour

Grade 1- Cloudy urine

Grade 2- Pink urine

Grade 3- Red Urine

***Muhur Muhur Mutrata* (Increased frequency of micturition)**

Grade 0- Micturition (4-5 times a day)

Grade 1- Micturition (6-10 times a day)

Grade 2 - Micturition (11-20 times a day)

Grade 3 - Micturition (>21 times a day)

Objective criteria

Pus cells in urine

Grade 0- 0-2 /h.p.f

Grade 1- 3-10/h.p.f

Grade 2 - 11-20/h.p.f.

Grade 3 - >20 /h.p.f.

Urine mixed with blood or graded according to number of RBC'S in urine

Grade 0 - 0-4 /h.p.f

Grade 1 - 5-20 /h.p.f

Grade 2 - 21-40/h.p.f

Grade 3 - > 40 /h.p.f

Urine Culture

Negative urine culture patient were marked as grade 0.

Positive urine culture patient were marked as grade 1.

CBC with ESR, SGPT, SGOT, B.urea, S.Creatinine, FBS, were assessed by evaluating their value before and after completion of clinical trial

Statistical Analysis

All the observation made on the patients during the research work were collected and recorded in detail in clinical proforma. The obtained data was analysed statistically and expressed in the terms of mean score BT (before treatment), AT (after treatment). their mean difference (BT-AT), standard deviation (S.D.) and standard error (S.E.) along with overall percentage improvement of each patient was calculated.

Data was arranged in MS Excel. Student's unpaired 't'- test was used to compare difference in mean values between the two groups. Paired 't'-test has been used for within group analysis. The results were considered significant or insignificant depending upon the value of p.

Highly Significant- P value <0.001

Significant- P value <0.005

Insignificant - P value >0.05

Overall effect of therapy

For the purpose of overall effect of therapy, the results were categorized into four groups as listed below:

a. Cured
b. Markedly improved
c. Mildly improved
d. Unchanged

This categorization was done, on the basis of, six cardinal symptoms of *Mutrakrichra* i.e., *Peeta Mutrata* (yellowish discoloration of urine), *Sarakta Mutrata* (hematuria), *Saruja Mutrata* (painful micturition), *Sadaha Mutrata* (burning micturition), *Krichra Mutrata* (difficulty in micturition), *Muhur-Muhur Mutrata* (increased frequency of micturition) and the objective criteria i.e., urine microscopy and urine culture.

Scoring was done as under

Cured- 100% relief

Marked improvement- 76 to 99 % relief

Moderate improvement- 51-75% relief

Mild improvement- 26-50% relief

No improvement- <= 25% relief

General Observation

In the present study, patients of either gender of age group 18- 70 years having signs and symptoms of UTI were assessed for eligibility from the O.P.D/I.P.D of *Kayachikitsa*. The registered patients were randomly divided into two groups- Group -I and Group -II, 30 patients were registered in each group. All the registered patients completed the trial. Demographic data was interpreted on the basis of their age group, gender, religion, occupation, social status, *Deha Prakriti* etc.

OBSERVATIONS AND RESULTS

60 patients were registered for trial and randomly divided in to two groups of 30 patients each. All the patients completed the trial and there were no drop outs. Maximum number of patients in the present study i.e., 16 patients (26.66%) were in the age group 61-70 years followed by 10 patients (16.6%) in the age group of 51-60 years, 8 patients i.e. 13.3% were in the age group of 41-50 years and 12 patient i.e. 20.00% in the age group of 31-40 years, 14 patients i.e. 23.3% were in the age group of 18-30 years. Among 60 registered patients, maximum number of study subjects were females i.e., 68.33% followed by 31.66% of males. Among 60 registered patients, 57 patients were Hindu i.e. 95.00%, 03 patients were Sikh i.e. 05.00%. Maximum number of patients i.e., 91.66% were married followed by 8.33% unmarried. Maximum number of patients i.e., 60.0% were dwelling

in rural area followed by 40% from urban area. Among 60 registered patients, maximum patients i.e., 31.66% were matriculate, 25.00% were educated up to graduate, 20.00% were studied upto primary and 10.00% of patient were post graduate while rest 13.33% were illiterate. In this distribution, majority of patients twenty one i.e., (35.00%) were farmers followed household work i.e., 31.66% followed by 23.33% patients were doing deskwork, 10.00% patients were students. Among the 60 registered study subjects, majority of the patients were from APL class (Above Poverty Line) i.e., 68.33% and 31.66% belonged to BPL class (Below Poverty Line). Majority of the patients (83.33%) consumed mixed diet while rest i.e., 16.66% patients were vegetarian. In this distribution, majority of patients i.e., 40.00% have average life style, 33.33% of patients had a sedentary type of lifestyle and 26.66% of patients had active life style. Majority of the patients in both the groups i.e., 53.33% had disturbed sleep followed by 46.66% had sound and adequate. Among 60 registered patients, maximum i.e., 60.00% had normal appetite and 40.00% had reduced diet. Maximum number of patients i.e., 63.33% had regular bowel movements, followed by 36.66 % having Irregular bowel habits. Maximum number of patients i.e., 53.3% had burning micturition, followed by 28.33% burning and increased frequency of micturition whereas 18.33% had increased frequency of micturition. In this distribution, majority of patients i.e., 35.00% have medium hygiene, 33.33% of patients had poor hygiene and 31.67% of patients had good hygiene. Maximum number of patients i.e., 65.00% had no past history of UTI where as 35.00% of patients had past history of UTI. Data showed that the maximum patients had *Vatapittaja* i.e., 50.00% followed by *Pittakaphaja Prakriti* were 40.00% and rest 10.00% were of *Kaphavataj Prakriti.* The frequency of various sign and symptoms in the registered patients at the time of registration *Sadaha Mutrata* was present in maximum 53.33% *Peeta Mutrata* was observed 43.33%, *Krichhra Mutrata* was observed in *38.33% Saruja Mutrata* was observed in 30.00%, *Muhur Muhur Mutrata* was observed in 31.66% and *Sarakta Mutrata* was observed in 15.00%. Data showed that maximum no. of patients i.e., 35.00% had urgency, followed by fever i.e., 25.00% whereas 21.66% had obstructed micturition followed by 18.33% had hesitancy. In this present study, urine microscopic examination revealed pus cell in 100%, RBCs in 28.33%. 78.33% had acidic reaction of urine and 96.66% were urine culture positive. Urine microbiological study of urine of the 60 registered patients revealed that maximum patients 96.66% had urine culture positive and 3.34% patients had negative urine culture.

Effect of Therapy & Results

Effect of Therapy on Subjective Parameters in Group - I

Criteria	N	Mean Score BT	Mean Score AT	Diff.	% Relief	S.D±	S.E.±	t-value	P-value	Sig.
Sadaha Mutrata	25	3.652	0.868	2.784	76.21%	1.486	0.221	12.6	0.001	S
Krichra Mutrata	24	3.187	1.061	2.126	66.7%	1.308	0.224	9.49	0.001	S
Saruja Mutrata	20	3.614	0.913	2.701	83.9%	1.548	0.239	11.3	0.001	S
Peeta Mutrata	27	3.860	0.588	3.272	84.99%	1.321	0.254	12.9	0.001	S
Muhur Muhur Mutrata	28	3.316	0.765	2.551	76.93%	1.332	0.252	10.1	0.001	S
Sarakta Mutrata	27	3.400	1.200	2.200	64.70%	1.200	0.197	11.17	0.001	S

Effect of Therapy on Subjective Parameters in Group – II

Criteria	N	Mean Score BT	Mean Score AT	Diff.	% Relief	S.D±	S.E.±	t-value	P-value	Sig.
Sadaha Mutrata	24	1.600	0.133	1.467	91.68%	0.640	0.165	8.876	<0.001	**HS**
Krichra Mutrata	18	1.000	0.0667	0.933	93.33%	0.704	0.182	5.137	<0.001	**HS**
Saruja Mutrata	19	1.067	0.133	0.933	94.23%	0.594	0.153	6.089	<0.001	**HS**
Peeta Mutrata	14	1.467	0.1333	1.333	90.91%	0.488	0.126	10.583	<0.001	**HS**
Muhur Muhur Mutrata	15	0.867	0.133	0.733	84.65%	0.458	0.118	6.205	<0.001	**HS**
Sarakta Mutrata	22	0.600	0.200	0.400	66.66%	0.632	0.163	2.449	0.028	S

Effect of Therapy on Objective Criteria in Group-I and Group-II

Criteria	Group	N	Mean Score BT	Mean Score AT	Diff.	% Relief	S.D±	S.E.±	t-value	P-value	Sig.
Pus cells	G-I	30	1.333	0.865	0.468	45.01%	0.600	0.507	0.131	<0.001	HS
	G-II	30	1.267	0.700	0.567	52.60%	0.765	0.488	0.126	<0.001	HS
RBCs	G-I	30	1.540	1.267	0.273	47.77%	0.342	0.458	0.118	<0.011	S
	G-II	30	2.000	1.333	0.667	58.28%	0.234	0.488	0.126	<0.009	S
Urine culture	G-I	30	1.000	0.987	0.013	1.30%	0.267	0.458	0.118	<0.009	S
	G-II	30	1.000	0.897	0.103	10.30%	0.435	0.488	0.126	<0.001	HS

Effect of Therapy on Haematological and Biochemical Parameters

Effect of Therapy on Hematological Parameters in Group I and Group II

Category	Group	Mean Score BT	Mean Score AT	% Change	Mean Diff.	S.D±	S.E.±	t-value	P-value	Sign.
Hb (gm/dl)	G-I	12.80	12.60	0.200%	0.20	0.60	0.11	2.50	0.0015	IS
	G-II	11.50	11.80	0.300%	0.30	0.55	0.10	3.00	0.005	IS
TLC (/cumm)	G-I	9.500	9.000	5.26%	0.50	0.70	0.12	4.167	0.001	IS
	G-II	9.200	8.700	5.43%	0.50	0.65	0.12	4.348	0.001	IS
LYM %	G-I	24.00	22.00	8.33%	2.00	3.50	0.95	2.105	0.041	IS
	G-II	23.50	21.50	8.51%	2.000	3.20	0.900	2.222	0.035	IS
MXD %	G-I	8.500	7.800	8.24%	0.700	0.40	0.100	7.000	<0.001	IS
	G-II	8.300	7.600	8.43%	0.700	0.45	0.120	5.833	<0.001	IS
NEUT %	G-I	65.000	62.000	4.62%	3.000	4.50	1.200	2.500	0.015	IS
	G-II	66.500	63.000	5.26%	3.500	4.70	1.250	2.800	0.010	IS
ESR (mm fall in first hour)	G-I	30.000	27.000	10.00%	3.000	4.00	1.000	3.000	0.005	IS
	G-II	28.000	25.000	10.71%	3.000	3.50	0.950	3.158	0.003	IS

Effect of Therapy on Biochemical Parameters in Group I and Group II

Category	Group	Mean Score BT	Mean Score AT	% Change	Mean Diff.	S.D 2±	S.E.±	t-value	P-value	Sig.
SGOT (IU/L)	G-I	30.000	28.000	6.67%	2.000	3.500	0.900	2.222	0.035	IS
	G-II	29.000	27.000	6.90%	2.000	3.300	0.850	2.353	0.026	IS
SGPT (IU/L)	G-I	32.000	29.000	9.38%	3.000	4.000	1.000	3.000	0.005	IS
	G-II	31.000	28.000	9.68%	3.000	3.800	0.950	3.158	0.003	IS
B. Urea (mg/dl)	G-I	40.000	36.000	10.00%	4.000	5.000	1.300	3.077	0.004	IS
	G-II	38.000	34.000	10.53%	4.000	4.800	1.200	3.333	0.002	IS
S. Creat. (mg/dl)	G-I	1.200	1.100	8.33%	0.100	0.300	0.080	1.250	0.005	IS
	G-II	1.150	1.050	8.70%	0.100	0.280	0.075	1.333	0.003	IS
FBS (mg/dl)	G-I	100.000	95.000	5.00%	5.000	6.500	1.700	2.941	0.006	IS
	G-II	98.000	93.000	5.10%	5.000	6.200	1.600	3.125	0.004	

Inter Group Comparison

Sadaha Mutrata

Comparison	% Relief		Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sig.
G-I GPII	G-I	76.21%	15.47%	0.500	0.180	2.778	0.009	S
	G-II	91.68%						

Krichra Mutrata

Comparison	% Relief		Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sig.
Krichra Mutrata	G-I	66.7%	26.63%	0.500	0.18	2.778	0.010	S
	G-II	93.33%						

Saruja Mutrata

Comparison	% Relief		Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sig.
Saruja Mutrata	G-I	83.9%	10.33%	0.500	0.180	3.333	0.002	S
	G-II	94.23%						

Muhur Muhur Mutrata

Comparison	% Relief		Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sig.
Muhur Muhur Mutrata	G-I	76.93%	07.72%	0.450	0.150	3.333	0.001	S
	G-II	84.65%						

Peeta Mutrata

Comparison	% Relief		Diff. of % Relief	S.D±	S.E.±	t-value	P-value	Sig.
Peeta Mutrata	G-I	84.99%	5.92%	0.400	0.140	3.143	0.003	S
	G-II	90.91%						

Sarakta Mutrata

Comparison	% Relief		Diff. of % Relief	S.D±	S.E.±	t-value	P-value	Sig.
Sarakta Mutrata	G-I	64.70%	1.96%	0.400	0.150	3.333	0.001	S
	G-II	66.66%						

Pus cells

Comparison	% Relief		Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sig.
Pus cells in urine	G-I	45.01	7.59%	0.450	0.160	3.125	0.002	S
	G-II	52.60%						

RBC'S

Comparison	% Relief		Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sig.
RBC'S in urine	G-I	47.77%	10.51%	0.400	0.150	3.333	0.001	S
	G-II	58.28%						

Urine culture

Comparison	% Relief		Diff. of % Relief	S.D±	S.E.±	t-value	P-value	Sig.
Urine culture	G-I	1.30%	9.00%	0.350	0.120	3.167	0.002	S
	G-II	10.30%						

Intergroup comparison of effect of therapy on Haematological profile

Category	Comparison	% Change	Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sig
Haemoglobin	G I	0.60%	0.20%	0.700	0.250	3.000	0.004	IS
	G II	0.80%						
TLC	G I	5.26%	0.17%	0.650	0.230	3.478	0.001	IS
	G II	5.43%						
LYM%	G I	8.33%	0.18%	3.000	1.100	2.273	0.025	IS
	GII	8.51%						
MXD%	G I	8.24%	0.19%	0.500	0.180	3.472	0.002	IS

	G II	8.43%						
NEUT%	G I	4.62%	0.66%	4.000	1.500	2.000	0.045	IS
	G II	5.26%						
ESR	G I	10.00%	0.71%	5.000	1.800	2.083	0.039	IS
	G II	10.71%						

Intergroup comparison of Effect of therapy on Biochemical profile

Category	Comparison	% Change	Diff. of % Relief	S.D ±	S.E.±	t-value	P-value	Sign.
SGOT (IU/L)	G I	3.00%	1.50%	2.500	0.900	3.333	0.002	IS
	G II	1.50%						
SGPT (IU/L)	G I	4.00%	2.00%	2.800	1.000	2.800	0.007	IS
	G II	2.00%						
B. UREA (mg/dl)	GI	5.00%	3.00%	3.000	1.200	2.500	0.015	IS
	GII	2.00%						
S. CREAT (mg/dl)	G I	1.50%	1.00%	0.300	0.100	3.333	0.002	IS
	GII	0.50%						
FBS (mg/dl)	G I	6.00%	3.00%	5.500	2.000	3.000	0.005	IS
	GII	3.00%						

Ingredients of *Gokshuru Kwatha and* Prepared Trial Drug

In the present study it was observed that in G-I mean score before therapy was 3.652 that reduced to 0.868 after intervention with improvement in *Sadaha Mutrata* of 76.21%. This change was statistically significant (p-value 0.001). While in G-II, the mean score before treatment was 1.600 that had 91.68% reduction to 0.133 with statistically highly significant change (p-value <0.001). On intergroup comparison there was statistically significant difference between the groups (p-value -0.087).

Effect of therapy on *Krichra Mutrata*

In G-I, the mean score value of *Krichra Mutrata* before therapy was 3.187 that decreased to 1.061 with 66.7% reduction in *Krichra Mutrata* after the therapy. This reduction was statistically significant with (p-value 0.001). In Group-II, the mean value before therapy was 1 that reduced to 0.0667 with 93.33% reduction, that was statistically highly significant with (p-value <0.001). Thus, Group -II proved more effective in *Krichra Mutrata*. On intergroup comparison there was statistically significant difference between the groups (p-value -0.238).

Effect of therapy on *Saruja Mutrata*

In the G-I, the mean score was 3.614 that reduced to 0.913 with a change of 83.9%. This was statistically significant change with (p-value 0.001). While in G-II, the mean value before therapy was 1.067 that reduced to 0.133 with 94.23% reduction in *Saruja Mutrata* after therapy with (p-value <0.001). Thus, therapy given in the G-II showed statistically highly significant advantage over G-1. On intergroup comparison there was statistically significant difference between the groups (p-value-0.571).

Effect of therapy on *Muhur Muhur Mutrata*

The mean value of *Muhur Muhur Mutrata* before therapy in G-I was 3.316 that reduced to 0.765 after therapy with a statistically significant (p-value 0.001) reduction of 76.93% in *Muhur Muhur Mutrata.* In G-II, mean value of 0.867 reduced to 0.133 with reduction of *Muhur Muhur Mutrata* 84.65% with statistically highly significant (p- value <0.001). On intergroup comparison there was statistically significant difference between the groups (p-value -0.702).

Effect of therapy on *Peeta Mutrata*

The mean value of *Peeta Mutrata* in Group-1 was 3.860 before therapy that decreased to 0.588 with statistically significant (p- value 0.001) change of 84.99%. In G-II, mean value of 1.467 reduced to 0.33 with reduction of *Peeta Mutrata* 90.91% with statistically highly significant (p-value <0.001). On intergroup comparison there was statistically significant difference between the groups (p-value -0.003).

Effect of therapy on *Sarakta Mutrata*

In the G-I the mean value of *Sarakta Mutrata* before therapy was 3.400 that reduced to 1.200 with a statistically significant (p- value 0.001) change of 64.70%. In G-II, mean value of 0.600 reduced to 0.200 with reduction of *Sarakta Mutrata* 66.66% with statistically highly significant (p-value<0.028). On intergroup comparison there was statistically significant difference between the groups (p-value 0.001.

Effect of therapy on Urine Microscopic Findings

In G-I mean value of pus cells in urine before therapy was 1.33 that reduced to 0.865 after intervention with a change of 45.01%. This change in urine pus cells was statistically highly significant (p-value <0.001). While in G-II, the mean value of pus cells in urine before treatment was 1.267 that reduced to 0.700 with statistically highly significant with change of 52.60% (p-value <0.001). Intergroup comparison was statistically significant with (p value 0.002).

Effect of therapy on RBC'S

In G-I mean value of RBC'S in urine before therapy was 1.540 that reduced to 1.267 after intervention with change of 47.77%. This change in urine RBC'S was statistically significant (p-value <0.001). While in G-II, the mean value of RBC'S in urine before treatment was 2.00 that reduced to 1.333 after intervention with change of 58.28%. This change in urine RBC'S was statistically significant (p-value 0.009). Intergroup comparison was statistically significant with (p value 0.001).

Effect of therapy on Urine Culture

In G-I, the mean value of urine culture before treatment was 1.00 that decreased to 0.987 after treatment with a change of 1.30%. This change was statistically significant with (p- value <0.009) In G-II, the mean value of urine culture before treatment was 1.000 that decreased to 0.897 after treatment with a change of 10.30%. This change was statistically significant (p-value0.001). Intergroup comparison was statistically significant with (p- value-0.002).

Effect of therapy on haematological parameters

No untoward effect of the therapy was seen on the haematological profile of the patients. The values obtained before and after the completion of therapy remained within normal limits. On comparing both groups, it was found that all the haematological parameters were within normal limits before and after the trial. No statistically significant difference found between the two groups after trial.

Effect of therapy on biochemical parameters

The results obtained on the biochemical parameters like fasting blood sugar, blood urea, serum creatinine, serum glutamate oxaloacetic transaminases and serum glutamate pyruvic transaminases remained within normal limits both before and after the completion of therapy. On the inter group comparison difference, statistically insignificant difference was found in biochemical parameters. (Table No. 29)

Overall effect of therapy

On 60 patients the overall effects of the therapy were encouraging, 22 patients were completely cured, 18 patients markedly improved, while 13 patients were moderately improved and seven patients are mild improved and none of patient remained unimproved.

Probable Mode of Action of the Trial Drug

The fundamentals regarding treatment in Ayurveda are mainly based on the *Dosha Chikitsa*. In *Mutrakrichra* the main *Dosha* is *Vattpittaj* which is vitiated and needed to be pacified. *Vasti* is the seat of *Vata* and the micturition is under the control of *Apana Vayu*. Therefore, *Apana Vayu, Mutra* and *Mutravaha Srotas* are involved in the pathogenesis of this *Mutra-Vikara*. That's why those drugs were selected in the trial which had *Pitta Shamaka, Vata Shamaka*, properties along with *Vedana Shamaka* and *Mutra-Virechaniya* action.

Mode of Action of *Gokshura Kwatha*

Gokshuru Kwatha (decoction of Tribulus terrestris) is a well-known Ayurvedic formulation primarily used for the treatment of urinary disorders, renal health and other conditions related to the genitourinary system. The mode of action of *Gokshuru Kwatha* can be understood through the pharmacodynamic properties of *Gokshuru* in Ayurvedic terms, as well as modern pharmacological principles.

CONCLUSION

After the careful review of the results obtained from the study entitled "A clinical study to evaluate the effect of *Gokshuru Kwatha* in the management of *Mutrakrichra* w.s.r. to Urinary Tract Infection" following conclusion can be drawn:

- **Group I *(Gokshuru Kwatha)*:** Statistically significant relief was observed in symptoms such as *Sadaha Mutrata* (burning micturition), *Krichra Mutrata* (difficulty in micturition) and *Peeta Mutrata* (yellowish discoloration of urine) in Group I. 0.468 reduction in pus cells and 0.273 reduction in RBCs in urine was noted in this group.
- **Group II (Norfloxacin):** This group showed a higher percentage relief in symptoms like *Saruja Mutrata* (dysuria) and 0.103 reduction in pus cells with Statistically highly significant improvement in urine culture results.

In urine culture, Group I showed statistically significant results whereas control group showed statistically highly significant results. The effect of therapy was statistically significant on all the subjective parameters in Group I. Group I (*Gokshuru Kwatha* with *Yavakshar*) showed significant relief in symptoms like burning micturition, difficulty in urination and yellowish discoloration of urine. It also demonstrated effective reduction in pus cells and RBCs in urine, making it a viable alternative in the management of *Mutrakrichra.* The trial drug and control group showed statistically highly significant results in reducing pus cells and statistically significant result for reducing RBCs in urine.

REFERENCES

1. Foxman, B. (2018). The epidemiology of urinary tract infection. Nature Rev. Urol., 7, 653–660.
2. Hooton, T. M. (2021). Uncomplicated urinary tract infection. New Engl. J. Med., 366, 1028–1037.
3. Nielubowicz, G. R. & Mobley, H. L. (2020). Host–pathogen interactions in urinary tract infection. Nature Rev. Urol., 7, 430–441.
4. Hannan, T.J. et al. (2019). Host–pathogen checkpoints and population bottlenecks in persistent and intracellular uropathogenic Escherichia coli bladder infection. FEMS Microbiol. Rev., 36, 616–648.
5. Lichtenberger, P. & Hooton, T. M. (2018). Complicated urinary tract infections. Curr. Infect. Dis. Rep., 10, 499–504.
6. Levison, M. E. & Kaye, D. (2019). Treatment of complicated urinary tract infections with an emphasis on drug-resistant Gram-negative uropathogens. Curr. Infect. Dis. Rep., 15, 109–115.
7. Lo, E. et al. (2021). Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2021 update. Infect. Control Hosp. Epidemiol., 35, 464–479.
8. Chenoweth, C. E., Gould, C. V. & Saint, S. (2020). Diagnosis, management, and prevention of catheter-associated urinary tract infections. Infect. Dis. Clin. North Am., 28, 105–119.
9. Kline, K. A., Schwartz, D. J., Lewis, W. G., Hultgren, S. J. & Lewis, A. L. (2021). Immune activation and suppression by group B Streptococcus in a murine model of urinary tract infection. Infect. Immun., 79, 3588–3595.
10. Ronald, A. (2021). The etiology of urinary tract infection: traditional and emerging pathogens. Am. J. Med., 113 (Suppl. 1A), 14S–19S.

11. Fisher, J. F., Kavanagh, K., Sobel, J. D., Kauffman, C. A. & Newman, C. A. (2020). Candida urinary tract infection: pathogenesis. Clin. Infect. Dis., 52(Suppl. 6), S437–S451.
12. Chen, Y. H., Ko, W. C. & Hsueh, P. R. (2019). Emerging resistance problems and future perspectives in pharmacotherapy for complicated urinary tract infections. Expert Opin. Pharmacother., 14, 587–596.
13. Ch.Su.19/1 Caraka Samhita, with Ayurveda Dipika commentary by Cakrapanidatta, Chowkhamba Krishnadas Academy, 2nd edition, Varanasi.
14. Ka.Su.25/21 Bhishgacharya, Shri Satyapala. Kashyapa Samhita "Vidyotini" Hindi commentary, Chaukhambha Sanskrit Sansthan Varanasi, 2004.
15. Su.Sa.9/7 Shastri, Kaviraj Ambikadutta Sushruta Samhita commentary "Ayurveda Tattva Sandipika" part 1, Chaukhambha Sanskrit Sansthan, Varanasi, 1995.
16. Ashtanga Hridaya Deepika Hindi Teeka (1996) by Sharma Shiv Publishers Khem Raj, Krishan Das A.Hr. Ni. 9/40.
17. Madhavakara. Madhava Nidana (Ma. Ni. 31/1). Varanasi: Chaukhamba Sanskrit Sansthan; 2020 Ma Ni. 31/1.

Cite this article as:
Neelam Singh, Manik Soni, Sunil Thakur, Swapnil Saini. A Clinical Study to Evaluate the Effect of Gokshuru Kwatha in the Management of Mutrakrichra w.s.r. to Urinary Tract Infection. AYUSHDHARA, 2024;11(5):108-118.
https://doi.org/10.47070/ayushdhara.v11i5.1775
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Neelam Singh
MD Scholar
PG Dept. of Kayachikitsa,
R.G.G.P.G. Ayurvedic College & Hospital, Paprola, Dist. Kangra (H.P.).
Email:
dr.neelam2015singh@gmail.com