



Research Article

A CLINICAL STUDY TO EVALUATE THE EFFICACY OF SHATAVARI KWATHA ALONG WITH ITS ANTIMICROBIAL EFFECT IN GARBHINI MUTRAKRICHHRA W.S.R. TO UTI IN PREGNANCY

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ABSTRACT

Garbhini Mutrakrichhra is a common urinary disorder described under *Garbhini Vyadhi* in Ayurvedic classics given by *Acharya Kashyapa*. Pregnancy is considered more susceptible to urinary tract infections. *Shatavari* (*Asparagus racemosus*), described in *Yogaratanakara*, is a *Mutrala*, *Pittashamaka*, *Tridoshaghna*, and *Rasayana*. **Aim & Objectives:** To evaluate the efficacy of *Shatavari Kwatha* in the management of *Garbhini Mutrakrichhra* with special reference to UTI during pregnancy, to evaluate antimicrobial activity against selected uropathogen. **Materials & Methods:** After obtaining Institutional Ethics Committee approval and informed consent, 60 pregnant women diagnosed with UTI were enrolled in a randomized open-label comparative clinical study. Aqueous and hydroalcoholic extracts of *Shatavari* roots were prepared and evaluated for antimicrobial activity by the Agar Well Diffusion Method. **Results:** Both treatment groups showed statistically significant improvement in the clinical symptoms. *Shatavari Kwatha* produced significant symptomatic relief with antimicrobial activity, while nitrofurantoin demonstrated comparatively better improvement in microbiological parameters. In the experimental antimicrobial study, the aqueous extract not show any detectable zone of inhibition. The hydroalcoholic extract demonstrated detectable inhibitory activity against *Escherichia coli* at the highest tested concentration, producing a zone of inhibition of 12mm. **CONCLUSION:** *Shatavari Kwatha* is a safe, effective Ayurvedic intervention for the management of *Garbhini Mutrakrichhra* with special reference to UTI in pregnancy. It provides significant symptomatic relief. The hydroalcoholic extract of *Shatavari* demonstrated limited in vitro antibacterial activity against *E. coli* under the experimental conditions, while the aqueous extract did not show detectable antimicrobial activity.

INTRODUCTION

As stated in *Charaka Samhita*, special care of the pregnant woman is essential, as maternal health directly determines fetal well-being." The primary objective of antenatal care is to ensure the well-being of both the mother and the developing baby.^[1] Pregnancy represents a highly dynamic and demanding phase in a woman's life, marked by

continuous physical, physiological, and emotional changes. These transformations are not restricted solely to the genitourinary organs but extend to multiple systems of the body, including the cardiovascular, respiratory, and musculoskeletal systems. As a result, many women may experience varying degrees of discomfort, which, although often normal, require careful monitoring. Urinary tract infection (UTI) is one of the most common bacterial infections affecting individuals throughout their lifetime, and it holds particular clinical importance during pregnancy. Due to hormonal influences and anatomical changes, such as ureteral dilation and urinary stasis, pregnant women are at an increased risk of developing UTIs.^[2]

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In classical Ayurvedic literature, conditions related to urinary disturbances during pregnancy are described in detail by several *Acharyas*. *Acharya Kashyapa* have explained disorders such as *Mutrasanga* and *Mutragraha* under the spectrum of *Garbhini Vyadhi*. Additionally, *Acharya Chakradatta* has elaborated on the management of *Mutrakrichhra*, a condition characterized by painful or difficult urination. In modern antenatal practice, many pregnant women commonly exhibit signs and symptoms resembling *Mutrakrichhra*, which closely parallel those seen in urinary tract infections (UTIs), such as burning micturition, increased frequency, and discomfort.^[5] During *Garbhavastha* (pregnancy), a woman's *Bala* (strength or vitality) is naturally reduced due to the increased metabolic demands and systemic changes occurring in her body. This altered physiological state makes her more vulnerable to infections and other disorders, including urinary complications. Therefore, both Ayurveda and modern medicine recognize pregnancy as a period of increased susceptibility, highlighting the importance of preventive care and timely management to maintain maternal health. In Ayurvedic science, *Mutra-virechaniya* herbs have been extensively described in classical texts for maintaining the normal flow of urine and supporting urinary system health. These herbs not only facilitate proper urination but may also play a preventive role against urinary tract infections (UTIs), particularly during pregnancy when women are more susceptible due to physiological changes. One important classical preparation is *Shatavari Kwatha*, which is mentioned in the Ayurvedic text by *Acharya Yog Ratnakar*. This formulation is described as having *Tridoshaghna* properties, meaning it helps in maintaining the balance of all three fundamental *Doshas Vata, Pitta, and Kapha*. Because of this broad-spectrum action, it is considered especially useful in *Tridoshaja Mutrakrichhra*, a condition in which urinary discomfort arises due to the combined vitiation of all three doshas. *Shatavari* is having *Sheeta Virya* and *Madhur, Tikta Rasa*, it helps in reduction of *Mutrakrichhra* symptoms. *Mutral* property of *Shatavari* help in production of good amount of urine, flushing out the bacteria and thus reducing the sensitivity of bladder thus helps in voiding of urine. *Pitta Shamak* property helps in reduction of *Pitta dosha* which causes *Daha*. *Shatavari* is natural herb with pharmacological properties like antimicrobial, antioxidant, immune modulator.^[5-6]

Study Design: Randomized open label Comparative Clinical study.

1. In vitro antimicrobial study
2. Clinical study

Place of Study Study conducted at RGGPG Govt. Post Graduate Ayurvedic College and Hospital, Paprola, Dist. Kangra, HP.

Sample size & Study intervention

Number of Groups: Two groups

Group I: *Shatavari Kwatha*. 24ml BD for 10 days.

Group II: Tab. Nitrofurantion 100mg for 10 days.

Sample size (Number of patients): 60

Group I- 30 patients for *Shatavari Kwatha*.

Group II- 30 patients for Nitrofurantoin.

A total of 60 subjects fulfilling the inclusion criteria were initially enrolled in the present clinical study and randomly allocated into two groups. In Group I (*Shatavari Kwatha*), 30 subjects were registered; however, 5 subjects were lost to follow-up due to unavoidable or unfavourable circumstances, leaving 25 subjects who completed the study. Similarly, in Group II (Nitrofurantoin), 30 subjects were enrolled, of whom 5 subjects were lost to follow-up for similar reasons, resulting in 25 subjects completing the trial. Therefore, the final statistical analysis was carried out on 50 subjects, comprising 25 patients in Group I and 25 patients in Group II.

Antimicrobial Study

The in vitro antimicrobial activity of *Shatavari* root extracts was evaluated by the agar well diffusion method against selected uropathogenic microorganisms, namely *Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans*. Aqueous and hydroalcoholic extracts were tested at different concentrations and compared with standard antimicrobial agents. The aqueous extract did not produce any detectable zone of inhibition against the tested microorganisms. However, the hydroalcoholic extract demonstrated limited antibacterial activity against *E. coli* at the highest tested concentration, producing a zone of inhibition of 12mm. No detectable inhibitory activity was observed against *S. aureus* or *C. albicans*. The antimicrobial activity of the hydroalcoholic extract was considerably lower than that of the standard drugs, Nitrofurantoin and Fluconazole. These findings indicate that *Shatavari* possesses limited in vitro antibacterial activity, particularly against *E. coli*, under the experimental conditions of the present study. The observed activity may be attributed to the presence of bioactive phytoconstituents that are better extracted in hydroalcoholic solvents.

Protocol of Research

IEC Approval- The clearances were taken for the research from Institutional Ethical Committee (IEC) before starting the study vide certificate No. Ayu/IEC/2025/1499. **CTRI Registration-** The study

had also been registered in clinical Trial Registry of India vide CTRI Reg. No.: CTRI/2025/12/098866. Drugs were tested & Report of analysis was received vide No. DTL/PP/16/23-1002. Consent of patient was taken after making her aware of merits/ demerits of trial with duration of the proposed trial. Fulfilment of inclusion criteria. Registration of the pregnant women. Investigations mentioned were advised to her before and after trial.

Prakriti analysis

Inclusion Criteria

Pregnant female patients of gestational age 13 to 36 weeks. Clinically, diagnosed patients which fell under symptomatic criteria of *Garbhini Mutrakrichhra*. Pregnant woman without comorbidities.

Exclusion Criteria

Pregnant women less than gestational age of 12 weeks and gestational age above 36 weeks. Pregnant woman with comorbidities. Pregnant women who has taken antibiotic coverage recently.

Criteria of Assessment

All the subjects registered for the trial and the effect of therapy was assessed on the basis of subjective parameters and objective parameters.

Subjective Parameters

Clinical Features

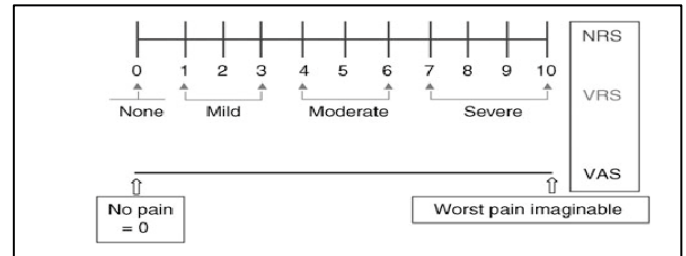
	Grade
<i>Sadahmutrata</i> (Burning micturition)	
No burning	0
Post void burning	1
Mid streaming burning	2
Burning throughout the act of micturition	3
<i>Krachhramutrata</i> (Difficulty in Micturition)	
No difficulty	0
Difficulty present at the beginning of the act of micturition	1
Difficulty present at the beginning and partially during rest of the act of micturition	2
Difficulty present throughout the act of micturition	3
<i>Muhur-Muhur Mutrata</i> (Increased frequency of Micturition)	
6-7 times day	0
8-10 times a day	1
11-12 times a day	2
>12 times a day	3
Urgency of micturition	
No urgency	0
Urgency but act of micturition is proper	1
Urgency and difficult to control	2
Urgency and difficult to control, passes few drops of urine	3

Overall score of each symptom was recorded as follows

- 1) 0- Absence sign or symptoms.
- 2) 1- Presence of Mild sign or symptoms.
- 3) 2- Presence of Moderate sign or symptoms.
- 4) 3- Presence of Severe sign or symptoms.

For the assessment of pain

VAS score for pain (visual analog scale)



1. No pain (0)	0
2. Mild pain (1, 2, 3)	1
3. Moderate pain (4, 5, 6)	2
4. Severe pain (7, 8, 9, 10)	3

Saruja Mutrata (Painful micturition)	
No pain	0
Mild pain	1
Moderate pain	2
Severe pain	3
Suprapubic pain	
No pain	0
Mild pain	1
Moderate pain	2
Sever pain	3
Suprapubic pain	
No pain	0
Mild pain	1
Moderate pain	2
Sever pain	3
Color of Urine	
Clear/pale	0
Dark yellow	1
Pink	2
Red & burgundy	3

Associated symptoms

Fever	Present	0
	Absent	1
Generalized body weakness	Present	0
	Absent	1

Objective Parameters

Suprapubic tenderness	Present	0
	Absent	1
Costovertebral tenderness	Present	0
	Absent	1
Temperature	98.4°F	0
	>98.4°F	1

Lab Investigations

Albumin in urine	
Nil	0
Trace	1
1+	2
>2	3
Epithelial cells in urine	
Nil	0
1- 10 HPF	1
11 - 20 HPF	2
Above 21 HPF	3
Pus cells in urine	
< 5 HPF	0

5 - 8 HPF	1
9 - 12 HPF	2
> 13 HPF	3
RBC in urine	
Nil	0
1- 10 HPF	1
11 - 20 HPF	2
Above 21 HPF	3
Serum creatinine	
0.5 to 1.0 mg/dl	0
>1.0 mg/dl	1
Bacteria	
Absent	0
Present	1
Urine culture	
No growth	0
Significant growth	1

Criteria for overall result assessment

1.	Markedly improved	Patients showing >75% relief in above mentioned symptoms
2.	Moderately improved	Patients showing 75% - 50% of relief in symptoms
3.	Partially improved	Patients showing 49% - 25% relief in symptoms
4.	Unimproved	Patients showing <25% relief in symptoms

Statistical Tests Used for Data Analysis

The data obtained during the study were compiled and statistically analysed to evaluate the efficacy of the trial interventions. Quantitative data were expressed as Mean, Standard Deviation (SD), and Standard Error (SE).

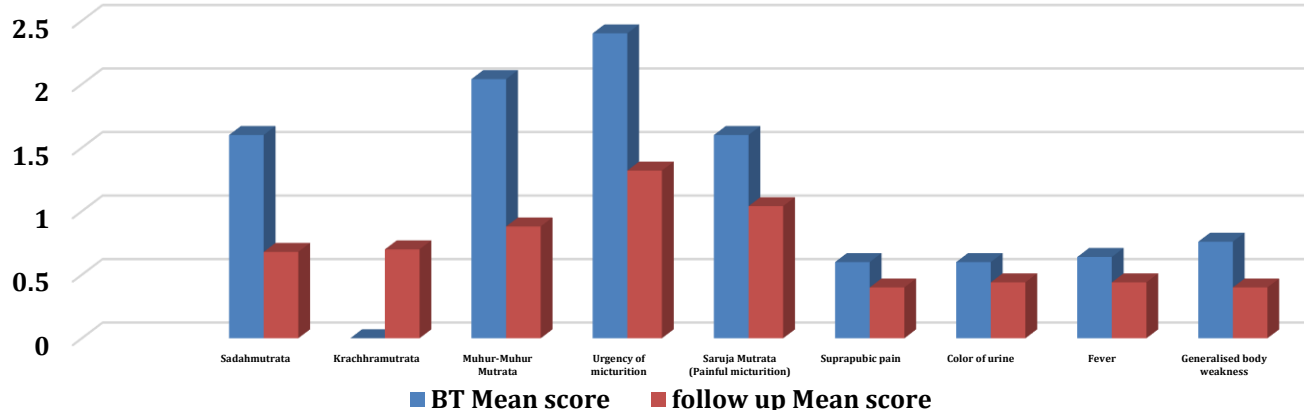
Paired Student's *t*-test: Applied for intragroup comparison of observations before treatment (BT) and after treatment (AT).

Unpaired Student's *t*-test: Applied for intergroup comparison between Group I and Group II.

OBSERVATIONS & RESULTS**Follow-ups****Follow up of Group I after 5 days on Subjective parameters and Associated symptoms**

S.No	Parameters	BT Mean score	1 st follow up Mean score	2 nd follow up Mean (AT)	% relief after 1 st follow up (After 5 Days)	% relief after 2 nd follow up (AT)
1	<i>Sadahmutrata</i>	1.600	0.680	0.480	57.50%	70.00%
2	<i>Krachhramutrata</i>	1.440	0.700	0.360	51.39%	75.00%
3	<i>Muhur-Muhur Mutrata</i>	2.040	0.880	0.440	56.86%	78.43%
4	Urgency of micturition	2.400	1.320	0.560	45.00%	76.67%
5	<i>Saruja Mutrata</i> (painful micturition)	1.600	1.040	0.520	35.00%	67.50%
6	Suprapubic pain	0.600	0.400	0.200	33.33%	66.67%
7	Color of urine	0.600	0.440	0.360	26.67%	40.00%
8	Fever	0.640	0.440	0.320	31.00 %	50.00%
9	Generalised body weakness	0.760	0.400	0.240	47.37%	68.42%

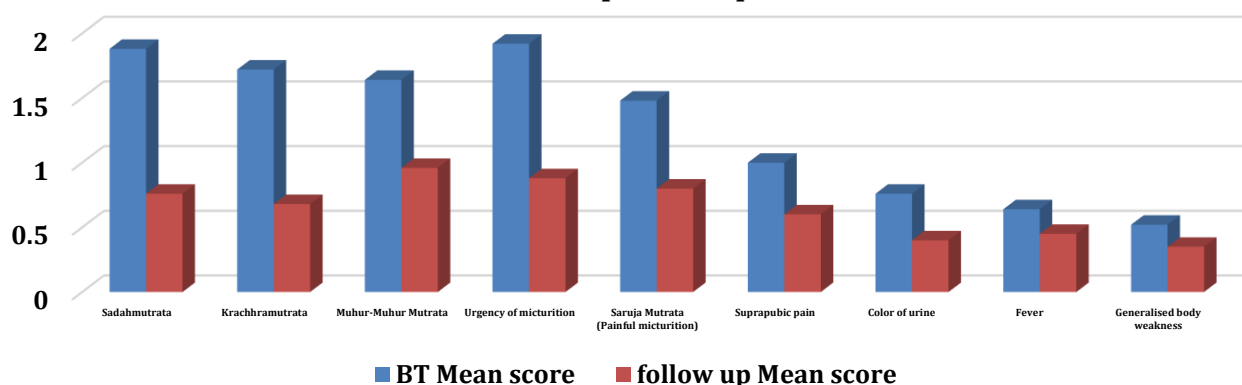
Follow up of Group I



Follow up of Group II after 5 on Subjective parameters and Associated symptoms

S.no	Parameters	BT Mean score	1 st follow up Mean score	2 nd follow up Mean score (AT)	% relief after 1 st follow up	% relief after 2 nd follow up (AT)
1	<i>Sadahmutrata</i>	1.880	0.760	0.160	59.57%	91.49%
2	<i>Krachhramutrata</i>	1.720	0.680	0.120	60.47%	93.02%
3	<i>Muhur-Muhur Mutrata</i>	1.640	0.960	0.240	41.46%	85.37%
4	Urgency of micturition	1.920	0.880	0.240	45.95%	87.50%
5	<i>Saruja Mutrata</i> (painful micturition)	1.480	0.800	0.120	45.00%	91.89%
6	Suprapubic pain	1.000	0.600	0.080	40.00%	92.00%
7	Color of urine	0.760	0.400	0.160	47.37%	78.95%
8	Fever	0.640	0.450	0.200	29.69 %	68.75%
9	Generalised body weakness	0.520	0.350	0.0800	32.69 %	84.62%

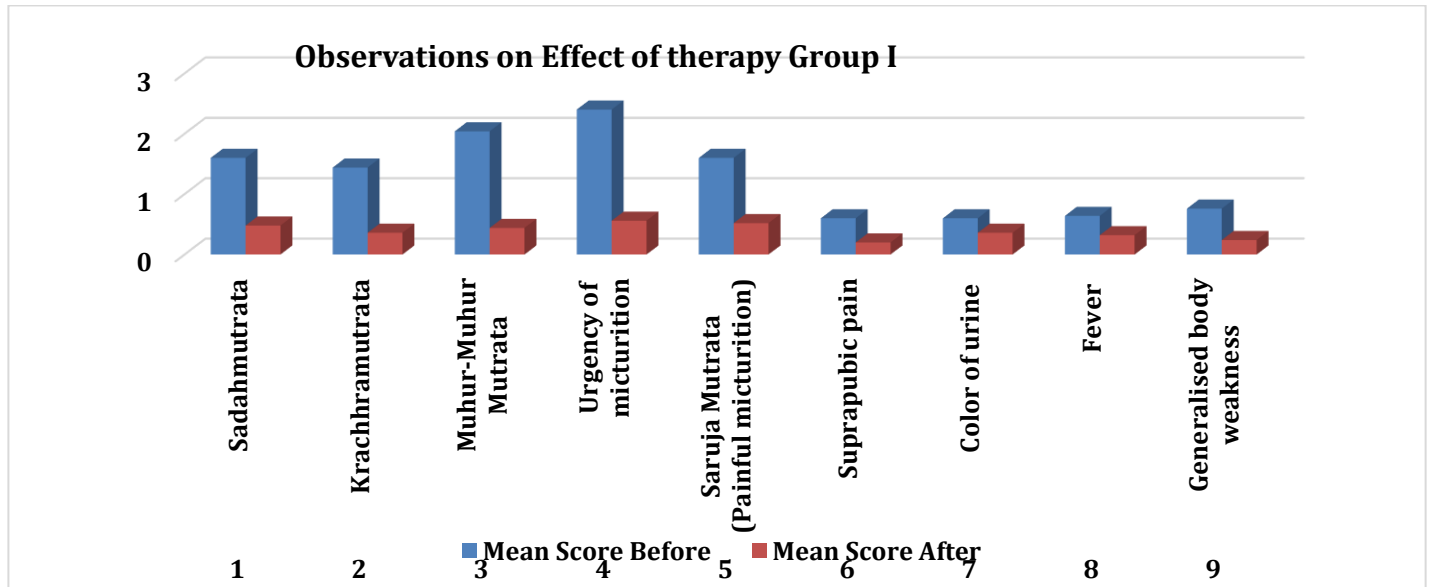
Follow up of Group II



Observations on Effect of therapy: Subjective Criteria and Associated symptoms in Group I

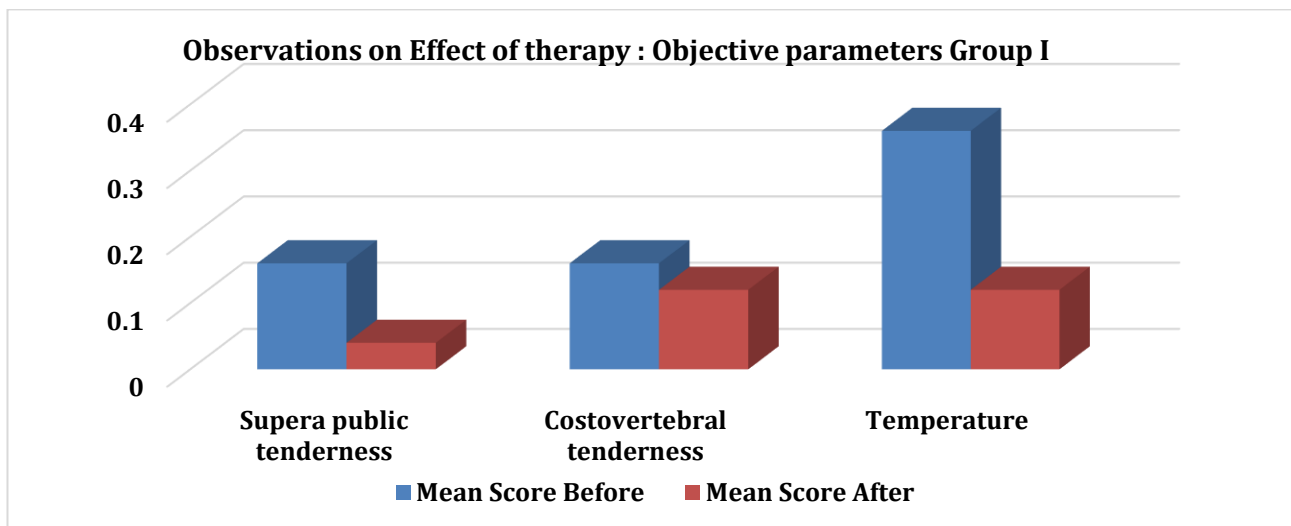
S.No	Criteria	Mean Score		Mean diff.	%	S.D.	S.E.	't'	p value	Result
		Before	After							
1	<i>Sadahmutrata</i>	1.600	0.480	1.120	70.00%	0.881	0.176	6.354	<0.001	H.S.
2	<i>Krachhramutrata</i>	1.440	0.360	1.080	75.00%	0.702	0.140	7.688	<0.001	H.S.
3	<i>Muhur-Muhur Mutrata</i>	2.040	0.440	1.600	78.43%	0.816	0.163	9.798	<0.001	H.S.
4	Urgency of	2.400	0.560	1.840	76.67%	0.987	0.197	9.325	<0.001	H.S.

	micturition									
5	<i>Saruja Mutrata</i> (painful micturition)	1.600	0.520	1.080	67.50%	0.702	0.140	7.688	<0.001	H.S.
6	Suprapubic pain	0.600	0.200	0.400	66.67%	0.764	0.153	2.619	0.015	S.
7	Color of urine	0.600	0.360	0.240	40.00%	0.436	0.087	2.753	<0.011	S.
8	Fever	0.640	0.320	0.320	50.00%	0.408	0.082	2.449	0.022	S.
9	Generalised body weakness	0.760	0.240	0.520	68.42%	0.510	0.102	5.099	<0.001	H.S.



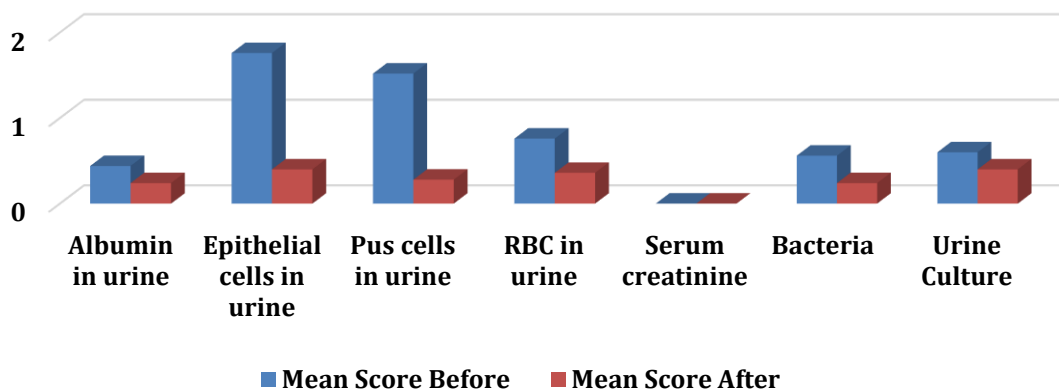
Observations on Effect of therapy: Objective parameters GroupI

Sr	Criteria	Mean Score		Mean diff.	%	S.D.	S.E.	't'	p value	Result
		Before	After							
1	Suprapubic tenderness	0.160	0.040	0.120	75.00%	0.332	0.066	1.809	0.083	NS
2	Costovertebral tenderness	0.160	0.120	0.040	25.00%	0.200	0.040	1.000	0.327	NS
3	Temperature	0.360	0.120	0.240	66.67%	0.436	0.087	2.753	0.011	S



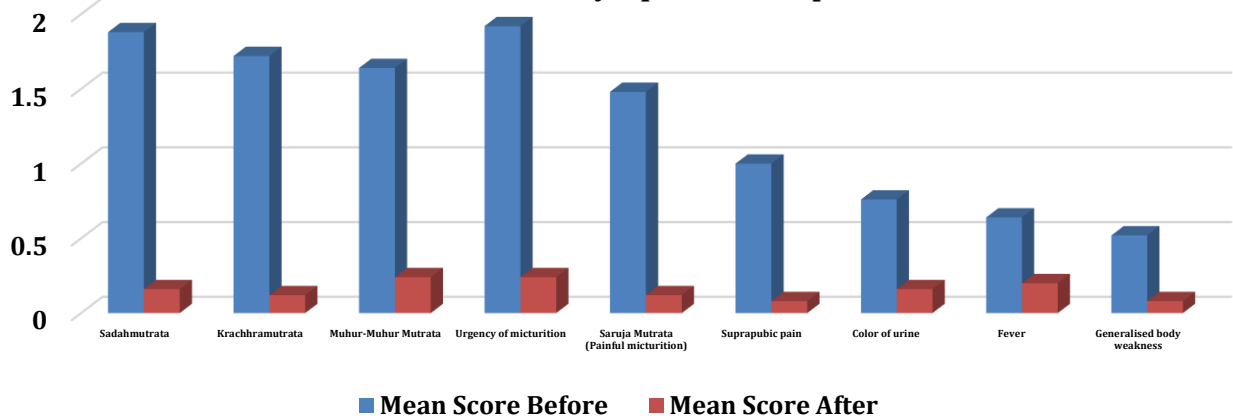
Observations on Effect of therapy: Lab Investigation Group I

S.No	Parameter	Mean Score		Mean diff.	%	S.D.	S.E.	't'	p value	Result
		Before	After							
1	Albumin in urine	0.440	0.240	0.200	45.45%	0.480	0.0816	2.449	0.022	S.
2	Epithelial cells in urine	1.760	0.400	1.360	77.027%	0.757	0.151	8.981	<0.001	H.S.
3	Pus cells in urine	1.520	0.280	1.240	81.58%	0.663	0.133	9.347	<0.001	H.S.
4	RBC in urine	0.760	0.360	0.400	52.63%	0.577	0.115	3.464	0.002	H.S.
5	Serum creatinine	0.000	0.000	0.000	-	0.000	0.000	0.00	1.000	N.S.
6	Bacteria	0.560	0.240	0.320	57.14%	0.467	0.0952	3.361	0.003	S.
7	Urine Culture	0.600	0.400	0.200	33.33%	0.500	0.100	2.000	0.057	N.S.

Observations on Effect of therapy: Lab Investigation Group I**Observations on Effect of therapy: Subjective Criteria and Associated symptoms Group II**

S.no	Criteria	Mean Score		Mean diff.	%	S.D.	S.E.	't'	p value	Result
		Before	After							
1	<i>Sadahmutrata</i>	1.880	0.160	1.720	91.49%	0.792	0.158	10.864	<0.001	H.S.
2	<i>Krachhramutrata</i>	1.720	0.120	1.600	93.02%	0.816	0.163	9.798	<0.001	H.S.
3	<i>Muhur-Muhur Mutrata</i>	1.640	0.240	1.400	85.37%	0.913	0.183	7.668	<0.001	H.S.
4	Urgency of micturition	1.920	0.240	1.680	87.50%	0.690	0.138	12.167	<0.001	H.S.
5	<i>Saruja Mutrata</i> (painful micturition)	1.480	0.120	1.360	91.89%	1.036	0.207	6.564	<0.001	H.S.
	Suprapubic pain	1.00	0.080	0.920	92.00%	0.759	0.152	6.058	<0.001	H.S.
7	Color of urine	0.760	0.160	0.600	78.95%	0.577	0.115	5.196	<0.001	H.S.
8	Fever	0.640	0.200	0.440	68.75%	0.507	0.101	4.342	0.001	H.S.
9	Generalised body weakness	0.520	0.0800	0.440	84.62%	0.507	0.101	4.342	<0.001	H.S.

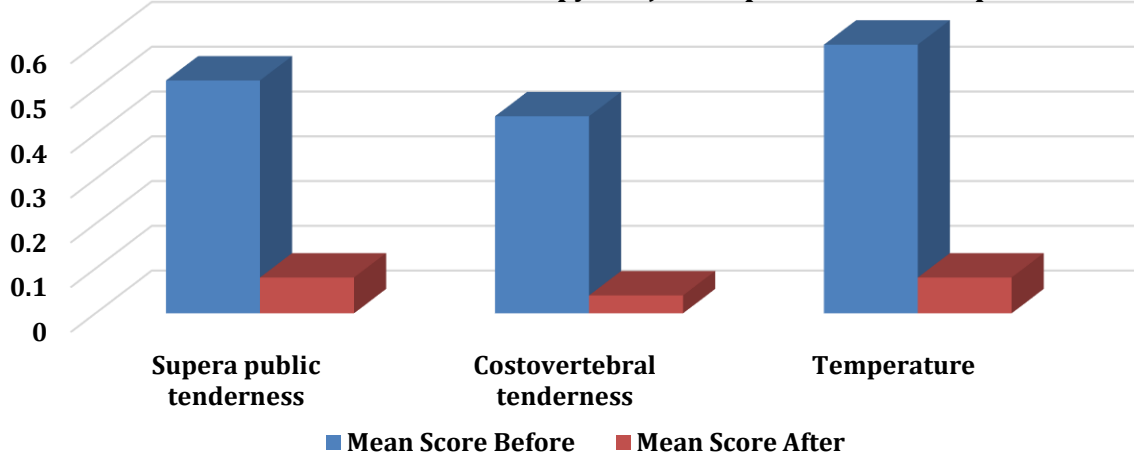
Observations on Effect of therapy : Subjective Criteria and Associated symptoms Group II



Observations on Effect of therapy: Objective parameters Group II

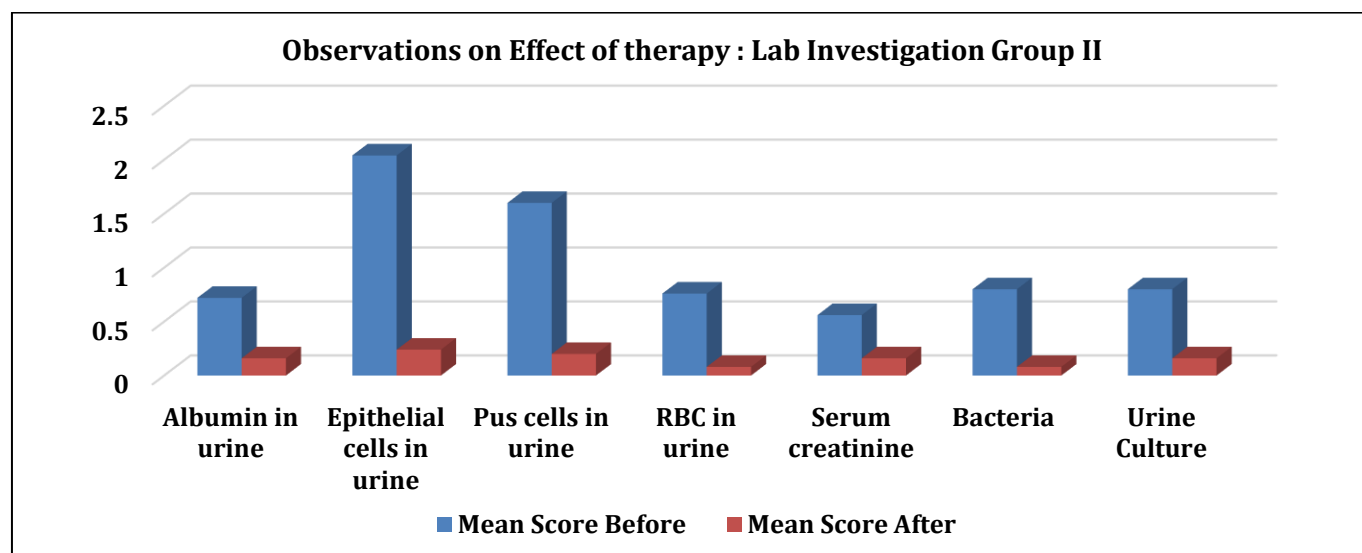
S.no	Criteria	Mean Score		Mean diff.	%	S.D.	S.E.	't'	p value	Result
		Before	After							
1	Suprapubic tenderness	0.520	0.080	0.440	84.62%	0.507	0.101	4.342	<0.001	H.S.
2	Costovertebral tenderness	0.440	0.040	0.400	90.91%	0.500	0.100	4.000	<0.001	H.S.
3	Temperature	0.600	0.080	0.520	86.67%	0.510	0.102	5.099	<0.001	H.S.

Observations on Effect of therapy : Objective parameters Group II



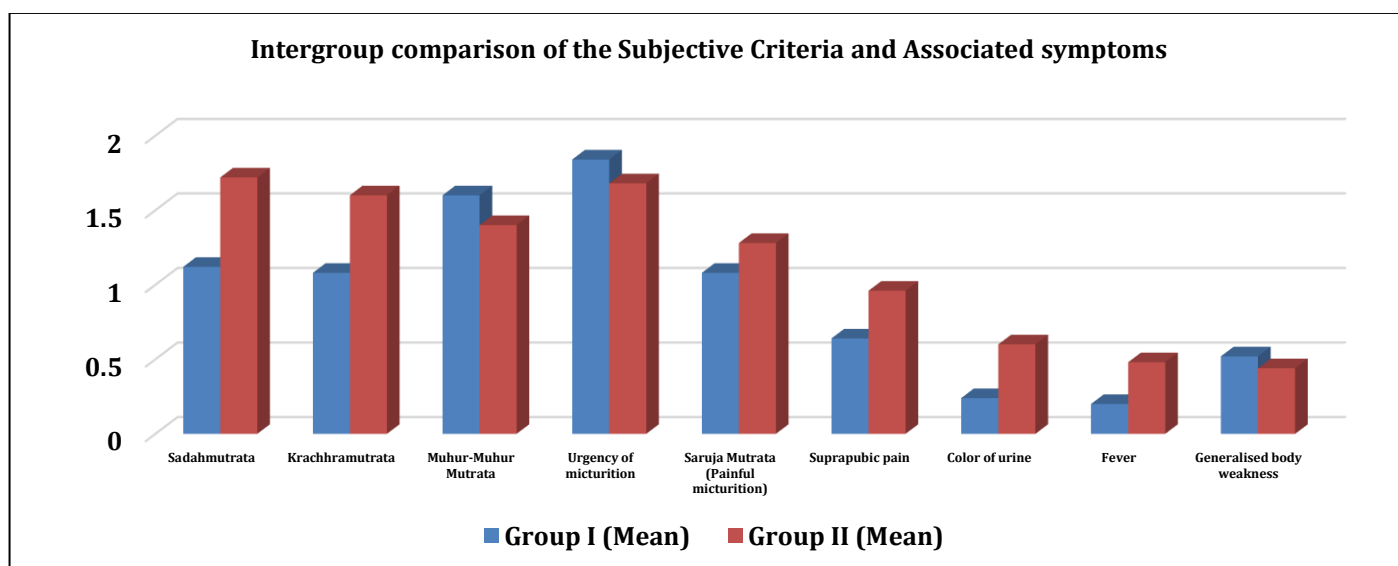
Observations on Effect of therapy: Lab Investigation Group II

S.No	Parameter	Mean Score		Mean diff.	%	S.D.	S.E.	't'	p value	Result
		Before	After							
1	Albumin in urine	0.720	0.160	0.560	77.78%	0.507	0.101	5.527	<0.001	H.S.
2	Epithelial cells in urine	2.040	0.240	1.800	88.24%	0.764	0.153	11.784	<0.001	H.S.
3	Pus cells in urine	1.600	0.200	1.400	87.50%	0.913	0.183	7.668	<0.001	H.S.
4	RBC in urine	0.760	0.080	0.680	89.47%	0.557	0.111	6.107	<0.001	H.S.
5	Serum creatinine	0.000	0.000	0.000	-	0.000	0.000	0.00	1.000	N.S.
6	Bacteria	0.800	0.080	0.720	90.00%	0.458	0.0917	7.856	<0.001	H.S.
7	Urine Culture	0.800	0.160	0.640	80.80%	0.490	0.0980	6.532	<0.001	H.S.



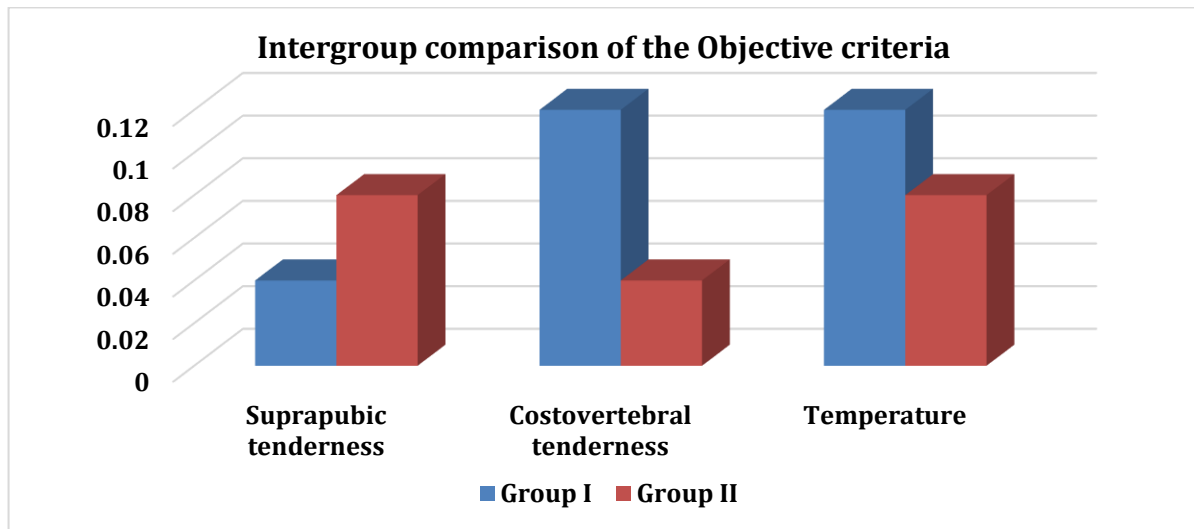
Intergroup comparison of the Subjective Criteria and Associated symptoms in 25 subjects of Group I & 25 subjects of Group II

S.No.	Parameter	Group I (n=25) Mean $\pm$ SD	Group II (n=25) Mean $\pm$ SD	SE Difference	t-value	p-value	Result
1	<i>Sadahmutrata</i>	1.120 $\pm$ 0.881	1.720 $\pm$ 0.792	0.237	-2.532	0.015	S.
2	<i>Krachhramutrata</i>	1.080 $\pm$ 0.702	1.600 $\pm$ 0.816	0.215	-2.414	0.020	S.
3	<i>Muhur-Muhur Mutrata</i>	1.600 $\pm$ 0.816	1.400 $\pm$ 0.913	0.245	0.816	0.418	N.S.
4	Urgency of micturition	1.840 $\pm$ 0.987	1.680 $\pm$ 0.690	0.242	0.664	0.510	N.S.
5	<i>Saruja Mutrata</i> (painful micturition)	1.080 $\pm$ 0.702	1.280 $\pm$ 0.891	0.226	-0.882	0.382	N.S.
6	Suprapubic pain	0.640 $\pm$ 0.860	0.960 $\pm$ 0.841	0.241	-1.330	0.190	N.S.
7	Color of urine	0.240 $\pm$ 0.436	0.600 $\pm$ 0.577	0.145	-2.488	0.016	S.
8	Fever	0.200 $\pm$ 0.408	0.480 $\pm$ 0.510	0.132	-2.143	0.037	S.
9	Generalised body weakness	0.520 $\pm$ 0.510	0.440 $\pm$ 0.507	0.101	0.556	0.580	NS

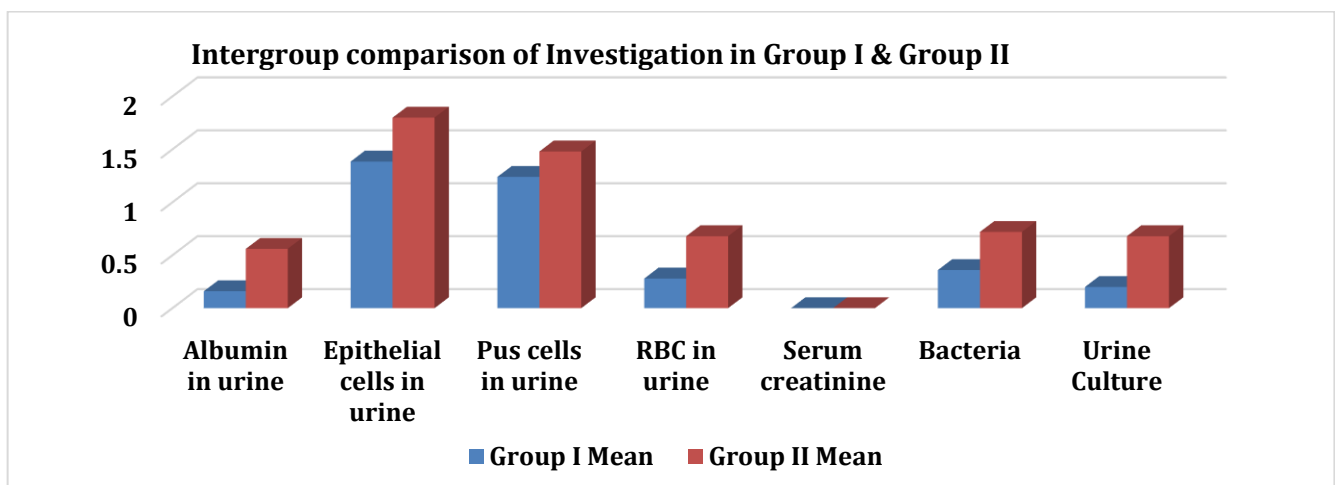


Intergroup comparison of the Objective criteria in 25 subjects of Group I & 25 subjects of Group II

S.No.	Parameter	Group I (n=25) Mean $\pm$ SD	Group II (n=25) Mean $\pm$ SD	SE Difference	t-value	p-value	Result
1	Suprapubic tenderness	0.040 $\pm$ 0.200	0.080 $\pm$ 0.277	0.068	-0.586	0.561	NS
2	Costovertebral tenderness	0.120 $\pm$ 0.332	0.040 $\pm$ 0.200	0.077	1.033	0.307	NS
3	Temperature	0.120 $\pm$ 0.332	0.080 $\pm$ 0.277	0.086	0.463	0.646	NS

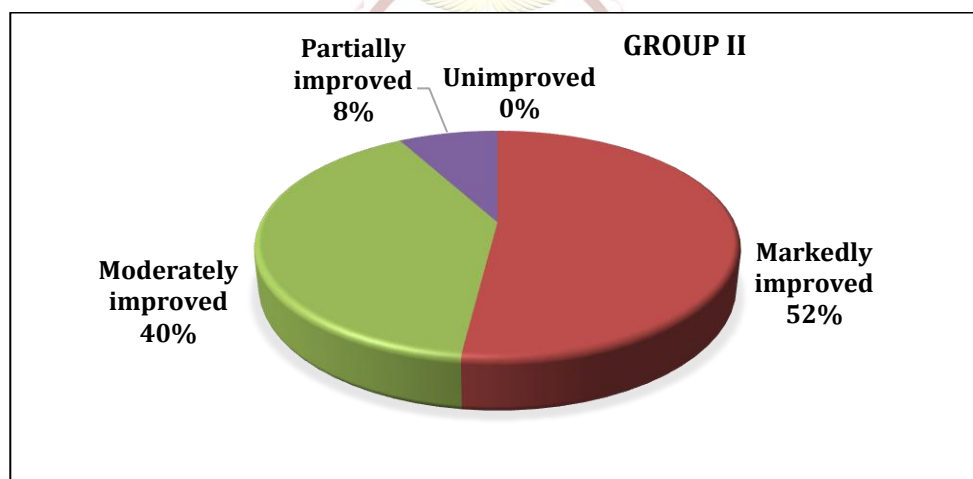
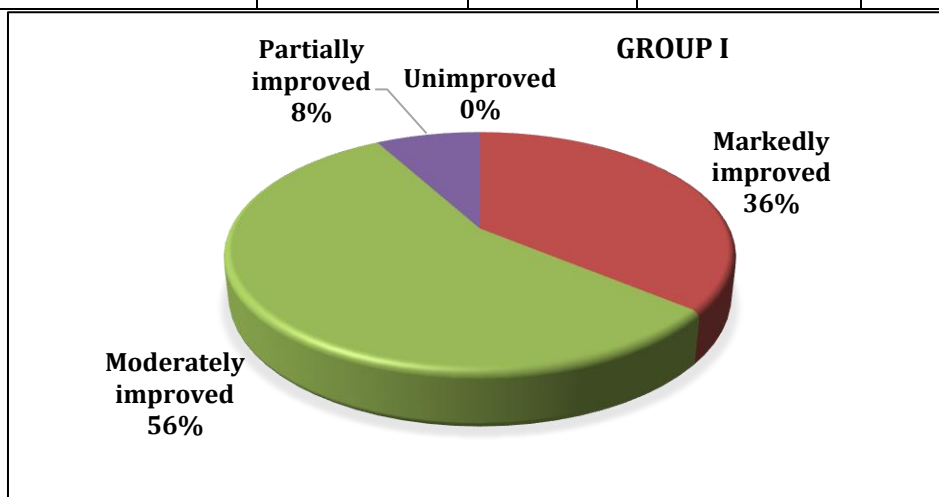
**Intergroup comparison of Laboratory Investigation in 25 subjects of Group I & 25 subjects of Group II**

S.No	Parameter	Group I (n=25) Mean $\pm$ SD	Group II (n=25) Mean $\pm$ SD	SE Difference	t-value	p-value	Result
1	Albumin in urine	0.160 $\pm$ 0.374	0.560 $\pm$ 0.507	0.126	-3.176	0.003	H.S
2	Epithelial cells in urine	1.385 $\pm$ 0.752	1.800 $\pm$ 0.764	0.213	-1.956	0.056	N.S.
3	Pus cells in urine	1.240 $\pm$ 0.663	1.480 $\pm$ 0.823	0.212	-1.136	0.262	N.S.
4	RBC in urine	0.280 $\pm$ 0.542	0.680 $\pm$ 0.557	0.155	-2.575	0.013	S.
5	Serum creatinine	0.000 $\pm$ 0.000	0.000 $\pm$ 0.000	0.000	0.000	1.000	N.S.
6	Bacteria	0.360 $\pm$ 0.490	0.720 $\pm$ 0.458	0.134	-2.683	<0.001	H.S
7	Urine Culture	0.200 $\pm$ 0.408	0.680 $\pm$ 0.476	0.125	-3.827	<0.001	H.S



Overall Assessment

Overall Result	Group I	%	Group II	%
Markedly improved	9	(36%)	13	(52%)
Moderately improved	14	(56%)	10	(40%)
Partially improved	2	(8%)	2	(8%)
Unimproved	0	(0%)	0	(0%)

**DISCUSSION**

The antimicrobial effect of Shatavari was evaluated through an in vitro experimental study using the Agar Well Diffusion Method. The aqueous extract did not show any detectable antimicrobial activity against the tested microorganisms. However, the hydroalcoholic extract demonstrated limited antibacterial activity against *Escherichia coli* at the highest tested concentration, producing a zone of inhibition of 12mm. No detectable activity was observed against *Staphylococcus aureus* or *Candida albicans*. This finding indicates that Shatavari possesses a limited antimicrobial effect, particularly against *E. coli*, under the experimental conditions of the present study. The comparatively greater activity

observed with the hydroalcoholic extract may be related to the extraction of bioactive constituents in the hydroalcoholic solvent. However, the antimicrobial effect was lower than that of the standard drugs, nitrofurantoin and fluconazole. Thus, the in vitro antimicrobial findings provide experimental support for the limited antibacterial effect of Shatavari, particularly against *E. coli*

In the present study, Group I treated with *Shatavari Kwatha* showed encouraging therapeutic results in the management of *Garbhini Mutrakrichhra*. Among the patients, 8% showed partial improvement, 56% showed moderate improvement, and 36% demonstrated marked improvement, while no patient

remained unimproved after completion of therapy. In Group II treated with Nitrofurantoin, 8% of the patients showed partial improvement, 40% achieved moderate improvement, and 52% demonstrated marked improvement, with no unimproved cases. Thus, both treatment modalities were effective in relieving the clinical manifestations of *Garbhini Mutrakrichhra*, although Group II exhibited comparatively higher marked improvement, particularly in laboratory and microbiological parameters.

The trial drug used in Group I was *Shatavari Kwatha* administered with *Sita* and *Madhu*. According to *Ayurveda*, *Shatavari* possesses *Madhura* and *Tikta Rasa*, *Guru* and *Snigdha Guna*, *Sheeta Veerya*, and *Madhura Vipaka*. These properties make it an excellent *Vatapittashamaka*, *Mutrala*, *Rasayana*, *Balya*, and *Garbhasthapaka* drug. Its *Sheeta Veerya* helps relieve burning micturition (*Sadahmutrata*), while *Madhura Rasa* and *Snigdha Guna* soothe the inflamed urinary mucosa and reduce irritation. The *Mutrala* action promotes proper urine flow, helping to flush microorganisms from the urinary tract and reduce urinary stasis, which is an important predisposing factor for urinary tract infection during pregnancy.

Shatavari is rich in bioactive constituents such as steroidal saponins (*Shatavarins*), flavonoids, polyphenols, alkaloids, mucilage, and essential minerals. These constituents are responsible for its diverse pharmacological activities. Experimental studies have demonstrated that *Shatavari* possesses anti-inflammatory, antioxidant, antimicrobial, immunomodulatory, and mild diuretic properties. The anti-inflammatory action reduces inflammation of the urinary epithelium, thereby relieving dysuria, burning sensation, and urinary discomfort. Its antioxidant activity protects the urinary mucosa from oxidative damage and promotes tissue healing, while its mucilage exerts a soothing and protective effect over the inflamed urinary tract.

The immunomodulatory and *Rasayana* properties of *Shatavari* strengthen the body's natural defence mechanisms (*Vyadhikshamatva*), thereby enhancing resistance against recurrent urinary infections. The antimicrobial activity of *Shatavari*, particularly against *Escherichia coli*, the most common causative organism of urinary tract infection, may have contributed to the reduction in bacterial load observed in the present study. The addition of *Sita* provided a cooling and *Pittashamaka* effect, relieving burning micturition and urinary irritation, whereas *Madhu*, owing to its *Yogavahi* property, enhanced drug delivery and contributed antimicrobial and wound-healing effects.

Nitrofurantoin, the standard antimicrobial drug used in Group II, acts by inhibiting bacterial enzyme systems and effectively eliminating common urinary pathogens. Therefore, it produced comparatively greater improvement in urine culture, bacteriuria, albuminuria, and other laboratory parameters. However, *Shatavari Kwatha* provided significant symptomatic relief while simultaneously improving maternal strength, maintaining urinary tract health, enhancing immunity, and supporting pregnancy through its *Rasayana* and *Garbhasthapaka* properties.

Thus, the findings of the present study indicate that *Shatavari Kwatha* with *Sita* and *Madhu* is an effective, safe, and well-tolerated Ayurvedic intervention for the management of *Garbhini Mutrakrichhra*. Although Nitrofurantoin showed comparatively better antimicrobial efficacy, *Shatavari Kwatha* effectively relieved urinary symptoms through its *Vatapitta shamaka*, *Mutrala*, *Rasayana*, anti-inflammatory, antioxidant, immunomodulatory, and antimicrobial actions. Therefore, *Shatavari Kwatha* may be considered a valuable supportive therapeutic option in the management of urinary tract infection during pregnancy.

CONCLUSION

Shatavari Kwatha has proven to be effective in the management of *Garbhini Mutrakrichhra* (UTI in pregnancy). The findings of the present study suggest that both *Shatavari Kwatha* and Nitrofurantoin were effective in reducing the signs and symptoms of urinary tract infection. However, Nitrofurantoin demonstrated comparatively better improvement in microbiological and laboratory parameters, while *Shatavari Kwatha* produced significant relief in clinical symptoms and improved the overall condition of the patients. The antimicrobial study revealed that *Shatavari Kwatha* exhibited antimicrobial activity against *Escherichia coli*, the most common causative organism of urinary tract infection. It was also observed that *Shatavari Kwatha* was safe, well tolerated, and no adverse drug reactions were reported during the study, indicating that it can be considered a safe supportive Ayurvedic therapeutic option for the management of *Garbhini Mutrakrichhra* during pregnancy. Further research may be undertaken to evaluate different dosage forms, longer duration of therapy, and combination with other Ayurvedic formulations to enhance its antimicrobial efficacy and prevent recurrence of urinary tract infection during pregnancy. *Shatavari* possesses immunomodulatory (*Rasayana*) properties that increase *Vyadhikshamatva* (innate immunity), thereby enhancing the body's natural defence mechanism against microbial infections, including urinary tract

infections. Based on the overall percentage improvement, Group II (Nitrofurantoin) achieved 77.44% relief and was considered as 100% therapeutic efficacy. When compared with this reference, Group I (*Shatavari Kwatha*), which showed 55.34% relief, demonstrated 71.46% of the therapeutic efficacy of Nitrofurantoin. This indicates that *Shatavari Kwatha* achieved approximately 71.46% of the overall clinical effectiveness of Nitrofurantoin in the management of *Garbhini Mutrakrichhra* (UTI during pregnancy)

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