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Research Article

PHYTOCHEMICAL STUDY OF *GOKSHUR* (*TRIBULUS TERRESTRIS* LINN.) AND EVALUATION OF ITS ANTIBACTERIAL ACTIVITY WITH SPECIAL REFERENCE TO *MUTRAKRUCHCHA*

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ABSTRACT

Infection of the urinary tract is the second commonest site after respiratory tract infection. It is more frequent in women than men. Almost 50% women suffer UTI. In our classical texts, urinary tract infection is described as *Mutrakruchcha*. A great *Acharya Charak* has mentioned it in *Chikitsa sthana*, *Trimarmiya adhyay*, its 8 types and *Basti* as a *Marma*. For the treatment of all types of *Mutrakruchcha*, *Gokshur* is mentioned. *Gokshur* is diuretic, aphrodisiac, tonic and rejuvenating herb with the ability to build lean muscle and strength. *Gokshur* possess *Madhur rasa*, *Madhur vipaka* and *sheet Virya* which causes diuresis by increasing *Kleda* in the body. So in this study 30 patients complaining of urinary tract infection were taken. 50 ml of *Gokshur* decoction, twice a day was given orally for 30 days. Weekly assessment was done on the basis of sign and symptoms like *Mutra daha* (burning micturition), *Sashula mutrapravrutti* (painful micturition), *Bastishul* (suprapubic pain), *Mutrapravrutti* (frequency of micturition), *Jwaraprachiti* (fever with chills), *Sarakta mutrapravrutti* (haematuria), *Sapuya mutrapravrutti* (pyuria). Objective improvement was done on the basis of reduction in pus cells in urine and serum creatinine at initial and after 30 days. Subjective improvement was shown in percentage it was 67.71%. The observations were found to be significant. Paired t test was found to be highly significant at 1 % level of significance i. e. $p < 0.01$.

KEYWORDS: *Mutrakruchcha*, *Gokshur*, Dysuria, *Tribulus terrestris* Linn.

INTRODUCTION

Ayurveda, the Indian Indigenous system of medicine, dating back to the *Vedic* period (4500-1600 B. C.) has been integral part of Indian culture. It is *Upaveda of Atharva veda*, which has detailed description of medicinal plants, their properties, therapeutic uses and means to achieve healthy long life. The mains of *Ayurveda* are to maintain the health of healthy persons primarily and to cure the ailments of diseased once secondary^[3]. Thus *Ayurved* defines life as the union of body, mind and soul^[2]. The living man, a man of action (*Karma purusha*) is a union of *Tridoshas* (Three humours), *Sapta Dhatus* (seven basic tissues) and *Trimalas* (three excretions). These constitute the *Deha* (Body matrix). When there is imbalance between these above said entities, disease or *Roga* manifests^[4]. Kidney guard

blood volume, filter the blood and form urine, regulate water, electrolytes and acid-base balance, produce some hormones and participate in the metabolism. Approximately 50-70% of the body weight attributed to water^[18]. Urinary tract infection is very common. Low osmolality of urine, glucose, obstruction to urine flow, ph. between 6.0-7.0 favors bacterial growth causing UTI ^[1]. In the course of time modern science has developed and acquired more and more scientific and precise methods to treat the patient by doing progressive work on clinical and laboratorial evaluation of modern drug in various diseases. Modern science has established various drugs with their pharmacological action and efficacy in dysuria, including diuretics, urine alkanisers, and various antibiotics. In *Ayurved*, *Basti* is

described as an important organ (*Marma*) [6]. For the treatment of all type of *Mutrakruchcha*, *Gokshur* is mentioned. *Gokshur* possess *Madhur rasa*, *Madhur vipaka* and *Sheet virya*[7, 9-15], which causes diuresis by increasing *Kleda* in the body. *Gokshur* and also described for various therapeutic uses in diseases like *Mutrakruchha*, *Mutrighat*, *Alpamutrata*, *Mutrashmari*, *Shwas* and *Shotha*[19-24]. It has to accept the new challenges and be prepared to answer the queries of the modern man who has a right to know how the drug administered? How the drug is acting? What is the dose of the drug? To meet this new thrust of inquisitiveness, proper pharmacological evaluation on clinical ground of all *Ayurvedic* medicine is mandatory. Here we are going to evaluate the antibacterial action of *Gokshur*.

MATERIALS AND METHODS

Selection of cases

There was random selection of patient from O. P. D. and I. P. D. of Sheth R. V. Ayurvedic Hospital, Sion; Mumbai, India. Known cases of urinary tract infection were taken. Study was carried out as per Ethical Clearance Number-AMS/1560/13-14.

Type of study

Open labeled study.

Inclusion Criteria

1. Either sex
2. Age between 18yrs-60yrs
3. OPD/IPD
4. Known cases of urinary tract infection

Exclusion criteria:

1. Age less than 18 yrs and more than 60 yrs.
2. History of acute and chronic renal failure.
3. Patient's with major systemic illness e. g. AIDS, Diabetes Mellitus, Renal failure, HBsAg +ve, IHD, M. I. cancer, Tuberculosis, hepatic ailments.

Study design

Total no. of cases: 30

Duration of study: 30 days

Drug source: *Panchang of Gokshur (Tribulus terrestris linn.)*

Formulation: Decoction of *Gokshur (Tribulus terrestris linn.)*

Mode of administration: Oral

Dosage: 50 ml twice a day

Anupana: *Koshnodak* (Lukewarm water)

Diet: *Vyadhihetukara* diet is restricted

Follow-up: Every 07 days after first visit.

Assessment of Efficacy

A) Subjective improvement

Weekly assessment in reduction of following symptoms⁵.

1. Burning micturition
2. Painful micturition
3. Suprapubic pain
4. Frequency of micturition
5. Fever with chills
6. Hematuria
7. Pyuria

B) Objective improvement

1. Sr. Creatinine
2. Urine (Routine/microscopic)

Gradation according to symptoms is as follows

1. Burning micturition
0 - Absent
1 - Occasionally
2 - Occurs at particular time
3 - Continue
2. Painful micturition
0 - Absent
1 - Occasionally
2 - Occurs at particular time.
3 - Continue
3. Suprapubic pain
0 - Absent
1 - Mild
2 - Moderate
3 - Severe
4. Frequency of micturition per day
0 - 5 to 7 time
1 - 8 to 10 time
2 - 11 to 13 time.
3 - More than 13 time
5. Fever with chills
0 - Absent
1 - Occasionally
2 - Occur at particular time
3 - Continue
6. Hematuria
0 - Absent
1 - Occasionally

2 - Occur at particular time

3 - Continue

7. Pyuria

0 - Absent

1 - Occasionally

2 - Occur at particular time

3 - Continue

STATISTICAL ANALYSIS

Paired t-test to objective parameters at baseline and at the end of study (after 30 days)⁸. Subjective improvement has been shown in percentage.

RESULTS

Table 3: Comparative renal investigation before and after starting the treatment with Gokshur

Patient	S.Creatinine		X ₁ -X ₂	X ²
	Before X ₁	After X ₂		
1	4.0	3.8	0.2	0.04
2	3.5	3.6	-0.1	-0.2
3	2.8	2.9	-0.1	-0.2
4	3.8	3.6	0.2	0.04
5	4.5	4.2	0.3	0.09
6	5.0	4.8	0.2	0.04
7	4.0	4.2	-0.2	-0.4
8	3.2	3.4	-0.2	-0.4
9	3.7	3.2	0.5	0.25
10	3.9	3.6	0.3	0.09
Total			5.6	-0.65

MD(X)	SD	SE	T value
0.56	0.648	0.22	2.5

Table 4: Comparative Urine examination before and after starting the treatment

Patient	pus cell		Mean of Before X ₁	Mean of After X ₂	X ₁ -X ₂	X ²
	Before	After				
1	10-12	4-5	11	4.5	6.5	42.25
2	10-12	0	11	0	11	121
3	6-8	2-3	7	2.5	4.5	20.25
4	6-8	0	7	0	7	49
5	16-18	0	17	0	17	289
6	10-12	3-4	11	3.5	7.5	56.25
7	20-25	25-30	22.5	27.5	-5	-10
8	4-5	0	4.5	0	4.5	20.25
9	4-5	0	4.5	0	4.5	20.25
10	12-15	10-15	13.5	12.5	1	1
Total					58.5	609.2

MD(X)	SD	SE	T value
5.85	5.44	1.72	3.40

Table 1: Symptomatic relief within groups

SYMPTOMS	% of relief
Burning micturition	70%
Painful micturition	88%
Suprapubic pain	90%
Frequency of micturition	75%
Fever with chills	65%
Pyuria	30%
Hematuria	56%

Table 2: Symptom wise relief in %

	No. of Patients	Symptom wise relief %
Gokshur decoction	30	67.71%

Table 5 : Phytochemical Analysis

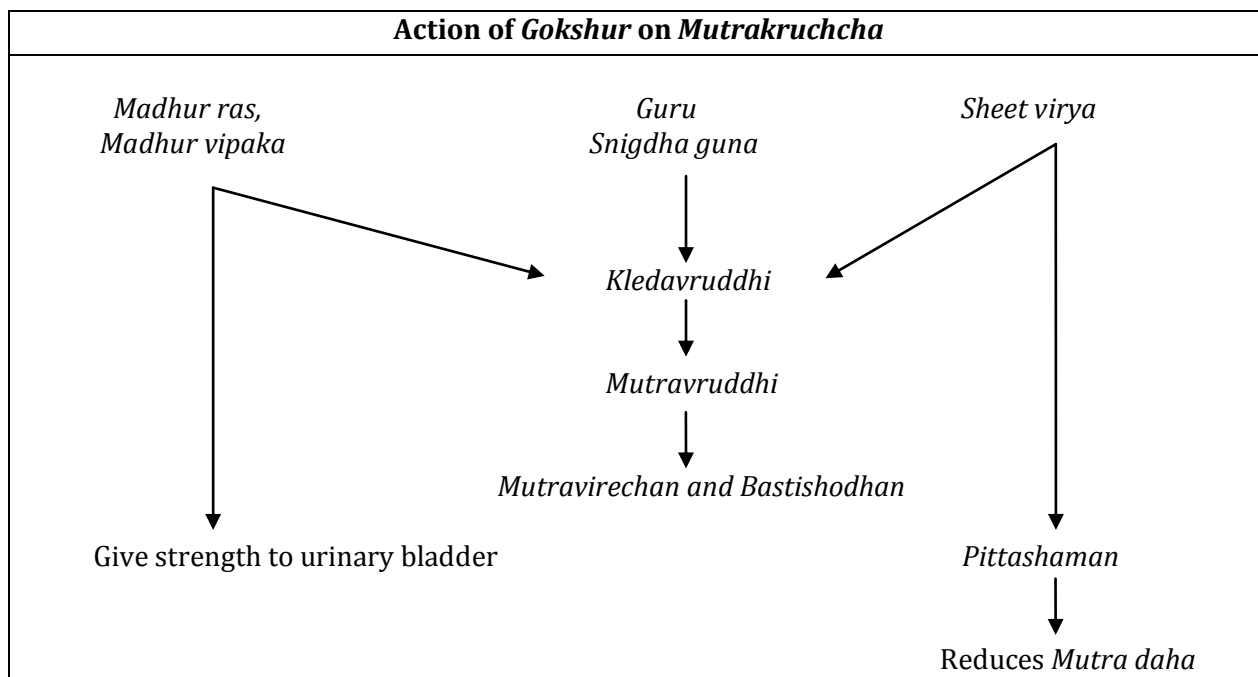
Sr.No.	Parameters	Result
1)	Description	Yellowish brown amorphous powder, slightly sweet, characteristic gandha
2)	pH	6.4
3)	Moisture content	NMT 5%
4)	Water soluble extractive value	NLT 60% w/w
5)	Alcohol soluble extractive value	NLT 40% w/w
6)	Chloroform soluble extractive value	Insoluble in chloroform
7)	Ash value	NMT 5 %w/w
8)	Elements	
	Lead (Pb)	Less than detectable limit.
	Mercury (Hg)	Less than detectable limit.
	Cadmium (Cd)	Less than detectable limit.
	Arsenic (As)	Less than detectable limit.
9)	TLC	
	Sample	<i>Gokshur</i> (<i>Tribulus terrestris</i> Linn.)
	Solvent system	Chloroform
	Detection	After spraying anisaldehyde H ₂ SO ₄
		R _f value Colour
		0.92 Yellowish green
		0.54 Yellowish green
		0.44 Yellowish green
		0.35 Yellowish green
		0.22 Yellowish green
		0.15 Dark blue

RESULTS

Subjective evaluation showed that there was significant improvement in symptoms of 30 patients. Percentage of relief in symptoms observed like Burning micturition 70%, Painful micturition 88%, Suprapubic pain 90%, Frequency of micturition 75%, Fever with chills 65%, Pyuria 30% and Hematuria 56% (Table 1). Result was evaluated by percentage of relief in each sign and symptoms of every patient was 67.71% (Table 2). In objective evaluation the level of pus cell in urine was reduced significantly. t value=3. 40 at 1% level of significant i. e. P< 0. 01 the level of serum

creatinine was reduced significantly, t value =2.5 at 5 % level of significant i. e., P < 0. 05 (Table 4). Total effect of therapy was evaluated by percentage of relief in each sign and symptoms of every patient. It was observed that maximum patients were markedly improved. The improvement in sign and symptoms was 67.71% (Table 2). The phytochemical analysis of powder of *Gokshur (Tribulus terrestris linn)* was done at Zandu pharmaceuticals, Mulund. The obtained values were in accordance with the standard *Ayurvedic Pharmacopeia of India* values (Table 5).

DISCUSSION



UTI symptoms are mainly *Pitta* predominant, *Gokshur* with its *Shita veerya* cools and soothes the urinary tract membrane by *pitta shaman*. It reduces inflammation and pain. *Gokshur* with its *Madhur rasa- vipaka* and *Snigdha guna* increase *Sharirastha kleda*. *Kleda* increases urine formation^[16]. It also has *Balya* action on *Basti* (urinary bladder). Urine contains metabolic waste, water, salt and toxins such as urea. 80-85% UTI is because of *E. coli* infection, rest 10-15% because of *Staphylococcus saprophyticus* and *klebsiella*. Presence of RBC, WBC, sugar proteins pus cells, etc indicates pathology in different parts of urinary tract. During the study, it is observed that *Gokshur* causes sodium loss from urine i.e. *natriuresis* ^[17]. As these solutes are not absorbed from the tubules it causes osmosis, so more and more water is drained away through the tubules causing diuresis. *Gokshur* contains saponin in large amount and this saponin must be acting as osmotic diuretics. So it acts as a diuretic by causing *natriuretic*. *Gokshur* preserve normal pH and reduce bacterial load. But it will be very difficult to state exact site of action of *Gokshur*.

CONCLUSION

The study has shown that 60% of the patients have improved completely symptomatically as well as biochemical investigation. 30% of the patients have got better relief, 10% of them have not improved. The study has shown that *Gokshur* has got antibacterial activity for the organisms responsible for lower urinary tract infection. As

Gokshur is acting as mild diuretic drug, it can be used in various disorders where there is fluid imbalance like cardiac, Renal, Liver diseases. So also it can be used in the patients who have got pedal edema, ascites, and generalized anasarca.

Again it can be used in the patients who have got renal calculus of small size, to flush out the stone. As this drug is a very weak diuretic, it can be used only in early cardiac failure i. e. in those who have got dyspnea exertion-grade I to II. But this cannot be used in acute renal failure or acute ventricular failure. So it is wonder drug of *Ayurved* causing increase in frequency of urination with its high doses and decreases frequency of urination with its low doses.

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