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EFFECT OF GOKSHURA (TRIBULUS TERRESTRIS LINN) GHANA TABLETS IN DIABETIC NEPHROPATHY: A PILOT CLINICAL STUDY

Dr. Deshpande Vaishali Shailesh*[1], Deshpande Shailesh Vinayak[2], Prof. Kohli Kuldeep Raj[3], Tamoli Sanjay[4] and Prof. Sakapal Shashikant S[5]

[1]Lecturer in Kayachikitsa, Sumatibhai Shah Ayurved College, Pune, Maharashtra, India.
[2]Associate Professor in Kayachiktsa, PDEA's College of Ayurved and Research Centre, Pune, Maharashtra, India.
[3]Director AYUSH, Government of Maharashtra, Mumbai, India.
[4]Director, Target Institute of Medical Education and Research, Mumbai, Maharashtra, India.
[5]Professor in Panchakarma, Shree Saptashringi Ayurveda College, Nashik, Maharashtra, India.

***Corresponding Author: Dr. Deshpande Vaishali Shailesh**

Lecturer in Kayachikitsa, Sumatibhai Shah Ayurved College, Pune, Maharashtra, India.

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ABSTRACT

Background: Incidence of Diabetic Nephropathy (DN) in on a rise with increased incidence of Diabetes mellitus. Derangement of renal function leads to end stage renal disease and dialysis or renal replacement remains the only remedy. Though angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blocker (ARB) are used in DN, these have their limitations. **Objectives**: To evaluate efficacy and safety of Gokshhura (T. terrestris) ghana tablets in Diabetic nephropathy. **Methodology**: Prospective, randomised, single blind, placebo controlled pilot clinical study was conducted. 57 patients of DN (35 to 70 years both ages inclusive), with raised 24-hour urinary protein and decreased creatinine clearance were screened. 42 patients were randomised in two groups. Group A received Gokshur ghana tablets one gram and group B received placebo, four times a day with water. Visits were at an interval of every four weeks, till 12 weeks. 24-hour urinary protein, creatinine clearance, haemogram, hepatic profile and glycosylated haemoglobin were measured at baseline and after 12 weeks, while renal profile, blood sugar and other clinical symptoms and examinations were measured at every 15 days visit. **Results**: Significant difference was seen in the treatment group in mean- 24-hour urinary protein ($p<0.05$), indicating decrease in protein loss, while no significant difference was seen in creatinine clearance ($p>0.05$). In the placebo group, increased 24-hour urinary protein ($p>0.05$) was seen and significant decrease in creatinine clearance was observed ($p<0.05$). Analysis between the groups did not show significant difference. **Conclusion**: The study concludes that consumption of Gokshura in a dose of 1 gm four times a day may help in in reducing protein loss and preserving renal functions.

KEYWORDS: Kidney disease, renal function, decreased glomerular filtration, protein loss, Prameha Upadrava, ayurveda.

INTRODUCTION

Nephropathy is one of the commonest complications of diabetes occurring due to microangiopathies. As the number of diabetics is on a rise, prevalence of its complications is also increasing. In a cross-sectional epidemiological study in diabetics, prevalence of microalbuminuria was found to be 39.8% and the prevalence of macroalbuminuria was 18.8%.[1] Egyptian renal data system (1996–2001) evaluated for the prevalence of Diabetic Nephropathy, showed gradual increase from 8.9% in 1996, to 14.5% in 2001.[2] Renal failure is the second leading cause for deaths due to Diabetes.[3]

Current treatment modalities include use of angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blocker (ARB) for prevention of nephropathy in early stages and dialysis or renal transplant in advanced stages. Though ACE inhibitors and ARBs are used however these though are well tolerated are not always safe and effective. Studies have shown that quality of life of patients on haemodyalisis is significantly impaired [4]. Renal transplants are currently used, however the same has its own limitations. Various herbs have shown potential Nephro-protective effects and have been extensively researced for these effects. These herbs include boerhavia diffusa, Tribulus terrestris, Curcuma longa amongst others.

Gokshura (T. terrestirs Linn) is a well-known herb mentioned in classical ayurvedic texts. It is one of the important medicines used in diseases related to urinary

system (mutravaha srotasa).[5] It is also anti diabetic (pramehaghna) [5]. The published literature shows that T. terrestris has protective effect on kidneys in various animal models. References from ayurvedic treatises and various animal studies show it to be a potent herb in nephropathy. Hence present study was undertaken to evaluate possible beneficial effects of Gokshura (T. terrestris) in Diabetic nephropathy (DN).

OBJECTIVES

Primary objectives

Assessment of Renal functions in DN by evaluating effect of renal parameters like serum creatinine, blood urea, creatinine clearance, 24-hour urinary protein

Secondary Objectives

1. Assessment of effect of Gokshura Ghana on Clinical Symptoms of DN
2. Assessment of safety of Gokshura Ghana by evaluating safety laboratory parameters like haemogram, erythrocyte sedimentation ratio (ESR), liver function tests, blood sugar (BSL) fasting (F) and post prandial (PP), glycosylated haemoglobin (HbA_1c)
3. Assessment of safety of the study drug by evaluating occurrence of AE/ADR and SAE.

MATERIALS AND METHODS

Study Design

The study was undertaken as a part of post-graduation research work. It was a prospective, randomised, single blind, placebo controlled interventional study with 1:1 allocation ratio of the participants into two study groups.

Ethical Considerations

The study was approved by ethics committee of the study centre. All participants underwent informed consent process before conducting any study related activity.

Study Participants – Eligibility Criteria

After signing informed consent, each patient was screened for eligibility to participate in study.

Inclusion Criteria

Patients with raised 24-hour urine protein and decreased creatinine clearance was set as diagnostic criteria for DN. Known cases of DN of both gender, between age group of 35 years to 70 years (both years inclusive), diagnosed as per diagnostic criteria, with serum creatinine less than four milligrams per decilitre (mg/dl) and blood urea less than 80 mg/dl, having good glycaemic control (HbA_1c <8 %) were included in the study.

Exclusion Criteria

Patients with raised levels of serum creatinine (> 4 mg/dl) or blood urea (>80 mg/dl) or who were on dialysis or taking ACE inhibitors or ARBs were not included. Also, patients showing acute complications of diabetes (like infections) were not included in study.

Interventional Product /Study product

The study drug, Gokshura (T. terrestirs, Linn) ghana tablets were prepared at GMP certified Pharmacy. Identical placebo was used for blinding. Identical packing was used to ensure blinding of patients. The trial medicine containers were labelled as ‘A’ while placebo containers were labelled as ‘B’. Manufacturing date and expiry date were put on each container. Each container contained 56 tablets of trial medicine or capsules of placebo.

Study Procedures

Patients fulfilling the inclusion criteria were randomised as per computer generated block randomisation table with block size of six patients per group.

At baseline visit, detailed systemic examination was carried out in each subject for the observation of illness including evaluation of renal deficit. Detailed past and present illness as well as medicinal history was taken to rule out any pre-existing disease. Necessary investigations were performed to support diagnosis and for the assessment of glycemic control. Subjects were included in the study as per eligibility criteria. Symptoms of DN, such as anorexia (aruchi), loss of appetite (agnimandya), facial oedema (mukha shotha), pedal oedema (pada shotha), dysponea (shwasa kashtata), pallor (panduta), weakness (daurbalya), scanty micturition (mutralpata), if any, present in patients, were examined and noted based on four-point scale. [Table 1].

Table 1: Gradation of Symptoms of Diabetic Nephropathy.

Symptom	Gradation
Anorexia (aruchi)	Grade 0: Desire to eat. Grade 1: Decreased desire to eat with no nausea. Grade 2: Decreased desire to eat with nausea. Grade 3: No desire to eat with severe nausea.
Loss of appetite (agnimandya)	Grade 0: Three meals a day with no indigestion. Grade 1: Three meals a day with indigestion. Grade 2: Two meals a day with indigestion. Grade 3: One meal a day with indigestion.
Facial oedema (mukha shotha)	Grade 0: No facial oedema Grade 1: Morning infra-orbital, facial oedema reducing to normal within 1 hour Grade 2: Facial oedema persisting for1-6 hours from morning Grade 3: Persistent facial oedema
Pedal oedema (pada shotha)	Grade 0: No Pedal oedema Grade 1: Occasional pedal oedema. Grade 2: Pedal oedema only visible in the evening hours. Grade 3: Persistent Pedal oedema throughout day and night
Dysponea (shwasa kashtata)	Grade 0: Normal Grade 1: Dyspnoea on more exertion. Grade 2: Dyspnoea on little exertion. Grade 3: Dyspnoea at rest
Pallor (panduta)[1]	Grade 0: Haemoglobin in males 17 gm% and in females 15 gm% Grade 1: Haemoglobin in males more than 13 but less than 17 gm% and in females more than 11 but less than 15 gm% Grade 2: Haemoglobin in males more than 10 but less than 13 gm% and in females more than 8 but less than 11 gm% Grade 3: Haemoglobin in males less than 10 gm% and in females less than 8 gm%
Weakness (daurbalya)	Grade 0: Normal with the best efficacy in walking fast for long distance. Grade 1: Able to walk for 1 to 2 km. Grade 2: Able to walk one km. Grade 3: Unable to walk and work for even routine minor activities.
Scanty micturition (mutralpata)	Grade 0: Normal Urine output i.e. 2000 ml and above in 24 hours. Grade 1: Urine output 2000 ml to 1500 ml in 24 hours. Grade 2: Urine output 1500 ml to 1000 ml in 24 hours. Grade 3: Urine output below 1000 ml.

[1. Gradation as per normal reference range for haemoglobin at study site]

Patients fulfilling inclusion criteria were randomised and included in the study. The randomised subjects received either study medication or placebo. Subjects in Group A received two tablets containing 500 mg of Gokshura (T. terrestris) ghana four times a day with water while subjects in Group B received placebo four times a day with water. Patients were instructed about use of study medication and dosages for 30 days (five bottles each containing 56 tablets/capsules) were handed over to the patient. Subsequent follow ups were taken at interval of four weeks till the end of 12 weeks.

At each follow up every patient was assessed for the tolerability of the medication, and occurrence of any AE. Blood investigations including renal profile (serum creatinine, blood urea, blood urea nitrogen) BSL F and PP, urine routine and microscopic were conducted. Change in grade of symptoms which were seen at baseline was noted as per scale. Remaining study drug brought by the patient was checked for the medication compliance. At last follow up (12 weeks) along with renal profile, BSL F and PP, urine routine and microscopic, additional investigations – creatinine clearance, 24-hour urinary protein, haemogram, hepatic profile (serum bilirubin, SGPT, SGOT, serum albumin, serum protein), renal profile and HbA_1c were checked.

Outcomes

Primary efficacy parameters were creatinine clearance, 24-hour urinary protein measured at the baseline and at the end of 12 weeks and renal profile measured at the interval of four weeks till the end of 12 weeks. Symptoms observed in patients were measured to access subjective improvement according to four-point scale mentioned in table 1. Secondary efficacy parameters were lipid profile, Hepatic profile, Blood sugar (Fasting and Post Prandial), Hemogram, which were done at the baseline visit and at the end of the study (i.e. 12 weeks). Incidences of AE, SAE and ADR observed throughout the study period of 12 weeks were considered as safety parameters.

Sample Size

No standard method was used to calculate sample size. A total of 40 subjects were considered as completers with 20 subjects in the two groups (20 in study drug group and 20 in placebo group).

Statistical Analysis

Statistical analysis was done by qualified statistician using SPSS. All values were expressed as mean SD. Tests used for evaluation of statistical analysis were Student's T test and in case of multiple measurements repeated measure ANOVA was used. The statistical values obtained from the study were tested for 95% confidence level.

RESULTS

Out of 57 patients screened 13 patients did not meet inclusion criteria while two patients withdrew consent after screening. Hence 42 patients were randomised and were allocated to either of the two groups. 21 patients were randomised in each of the two groups. One patient in each group did not show up for regular follow ups and hence was dropped out. Twenty patients in each group completed the study. Flow chart of activities is outlined in figure 1.

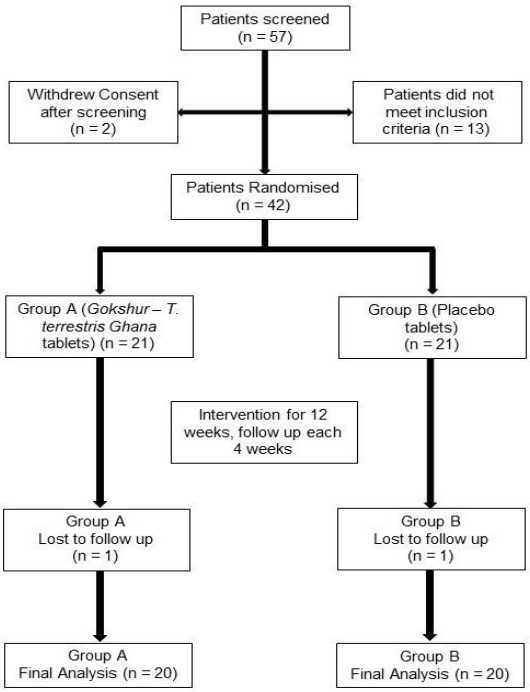


Figure 1: Flow Chart of Activities.

Out of 57 patients screened, 27 patients were male while 30 were female. Mean age in Group A was 61.4 ± 6.15 years, while in Group B it was 58.25 ± 7.97 ($p > 0.05$) [Table 2]

Table 2: Demographic Distribution of Subjects.

	Group A Gokshura (T. terrestirs LInn)	Group B Placebo	P value (between groups)
No. of Patients	20	20	--
Male / Female	12 / 8	6 / 14	--
Age in years	61.4 ± 6.15	58.25 ± 7.97	p>0.05 NS
Weight in kg	61.07 ± 9.64	59.45 ± 9.22	p>0.05 NS
BMI	22.62 ± 315	22.93 ± 2.61	p>0.05 NS
Chronicity of DM in years	10.68 ± 7.21	8.7 ± 5.31	p>0.05 NS

[BMI – Body mass index, DM – Diabetes mellitus, NS – Statistically not significant]

Effect on 24-hour urinary protein, creatinine clearance and renal function test

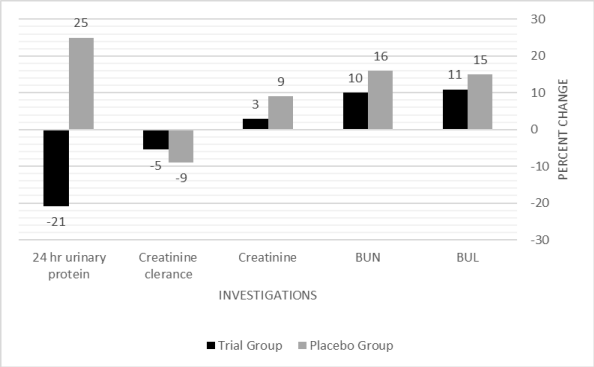
In group A (trial group), the mean values of protein excretion through urine at base line and at the end of study (12 weeks) showed a significant reduction ($p< 0.05$), while in placebo group (group B), it showed increase in mean protein excretion through urine but it was statistically not significant ($p> 0.05$). In case of creatinine clearance, in trial group, there was no significant change in the mean values from base line to the end of study ($p>0.05$), but in placebo group there was significant reduction ($p<0.05$). Analysis between the groups did not show any significant difference in any of the above parameters [Table 3].

Table 3: Effect on Protein Loss and Creatinine Clearance.

Investigation	Trial group		Placebo group		P value between groups
	Base line	12 week	Base line	12 week	
24 Hours Urine Proteins (mg / 24 hours)	585.15 ± 869.978	463.08 ± 723.945 (p < 0.05) S	383.90 ± 353.068	473.30 ± 646.277 (p > 0.05) NS	p > 0.05 NS
Creatinine Clearance (ml / min)	50.518 ± 11.4261	47.765 ± 12.2745 (p > 0.05) NS	56.045 ± 14.9444	48.625 ± 18.7121 (p < 0.05) S	p > 0.05 NS

[S – Statistically significant, NS – Statistically not significant]

In the treatment group mean values in 24-hour urinary protein showed decrease by 21 percent when compared to baseline, while there was increase of 25 percent in placebo group. Creatinine clearance decreased by five percent in treatment group, while it decreased by nine percent in placebo group. [Graph 1]



Graph 1: Change in Percentage of Means of Renal Functions Before and After Treatment.

Assessment of serum creatinine values showed no significant change in initial and final values in trial group ($p > 0.05$), while it showed significant increase in placebo ($P < 0.05$). However, all the mean values of creatinine were found within normal reference range in both groups. Mean blood urea and blood urea nitrogen values showed significant increase from baseline to post treatment in both groups ($p < 0.05$), but all the means were in within normal reference range. [Table 4]

Table 4: Effect on Renal Function.

Investigation	Trial group				Placebo group				P value between groups
	Base line	4 Weeks	8 Weeks	12 Weeks	Base line	4 Weeks	8 Weeks	12 Weeks	
Serum Creatinine (mg/dl)	1.22 ± 0.34	1.20 ± 0.21	1.25 ± 0.33	1.26 ± 0.36 (p>0.05) NS	1.17 ± 0.28	1.22 ± 0.22	1.24 ± 0.16	1.28 ± 0.18 (p<0.05) S	p > 0.05 NS
Blood Urea (mg/dl)	29.82 ± 10.9	32.15 ± 7.08	30.70 ± 9.37	33.08 ± 7.93 (p<0.05) S	31.23 ± 10.31	31.84 ± 7.73	34.40 ± 5.75	36.07 ± 5.094 (p<0.05) S	p > 0.05 NS
Blood Urea Nitrogen (mg/dl)	13.85 ± 5.23	15.04 ± 3.28	14.10 ± 4.29	15.25 ± 4.00 (p<0.05) S	11.64 ± 2.33	11.65 ± 1.70	12.90 ± 1.51	13.46 ± 1.60 (p<0.05) S	p > 0.05 NS

[S – Statistically significant, NS – Statistically not significant]

Effect on clinical symptoms

The commonest observed symptoms were pallor (panduta), anorexia (aruchi) and loss of appetite (agnimandya). There was a significant improvement in mean values of symptoms like – facial oedema (mukha shotha), pallor (panduta), weakness (daurbalya), anorexia (aruchi), scanty micturition (mutralpata) and loss of appetite (agnimandya) in the trial group. [Table 5].

Table 5: Effect on Symptoms of Diabetic Nephropathy.

Symptoms	Group	Week0	Week4	Week8	Week12	p-value
Facial oedema (mukha shotha)	PG	0.60 ± 0.60	0.75 ± 0.79	1.10 ± 0.91	1.10 ± 0.91	0.039 <0.05 S
	TG	0.65 ± 0.81	0.60 ± 0.75	0.30 ± 0.57	0.15 ± 0.37	
Pedal oedema (pada shotha)	PG	0.45 ± 0.76	0.60 ± 0.94	0.70 ± 1.03	0.75 ± 1.12	0.429> 0.05 NS
	TG	0.60 ± 0.88	0.55 ± 0.83	0.25 ± 0.72	0.25 ± 0.72	
Dysponea (shwasa kashtata)	PG	0.85 ± 0.75	1.05 ± 0.89	1.30 ± 0.98	1.35 ± 0.93	0.033 <0.05 S
	TG	0.90 ± 0.45	0.95 ± 0.39	0.55 ± 0.60	0.30 ± 0.47	
Pallor (panduta)[1]	PG	1.25 ± 0.44	1.30 ± 0.47	1.30 ± 0.47	1.25 ± 0.44	0.588 NS
	TG	1.25 ± 0.55	1.40 ± 0.50	1.30 ± 0.47	1.45 ± 0.51	
Weakness (daurbalya)	PG	0.85 ± 0.67	1.10 ± 0.72	1.40 ± 0.82	1.45 ± 0.76	0.045 <0.05 S
	TG	1.00 ± 0.56	1.00 ± 0.56	0.60 ± 0.75	0.55 ± 0.60	
Anorexia (aruchi)	PG	0.85± 0.49	0.95 ± 0.51	1.05 ± 0.60	1.15 ± 0.59	0.000 <0.05 S
	TG	0.65 ± 0.75	0.55 ± 0.60	0.25 ± 0.44	0.15 ± 0.37	
Scanty micturition (mutralpata)	PG	1.05 ± 1.00	1.10 ± 0.97	1.40 ± 0.82	1.85 ± 1.04	0.001 <0.05 S
	TG	0.60 ± 0.75	0.50 ± 0.61	0.35 ± 0.49	0.60 ± 0.99	
Loss of appetite (agnimandya)	PG	1.00 ± 0.73	1.00 ± 0.73	1.40 ± 0.60	1.45 ± 0.69	0.020 <0.05 S
	TG	1.05 ± 1.00	0.95 ± 0.89	0.50 ± 0.61	0.30 ± 0.47	

[PG – Placebo Group, TG – Trial Group, S – Statistically significant, NS – Statistically not significant]

Effect on glycemic control

No significant changes were foung in both the treatment and placebo group on glycemic parameters like blood sugar (fasting and post prandial) as well as Glyscated Hemoglobin. [Table 6]

Table 6: Effect on Glycemic Control.

Investigation	Trial group				Placebo group				P value between groups
	Base line	4 Weeks	8 Weeks	12 Weeks	Base line	4 Weeks	8 Weeks	12 Weeks	
Glycosylated Haemoglobin (HbA_1c)	7.56 ± 1.91	ND	ND	7.23 ± 1.56 (P>0.05) NS	7.43 ± 1.44	ND	ND	7.78 ± 1.47 (P<0.05) S	p > 0.05 NS
Blood Sugar Fasting (mg/dl)	136.05 ± 41.44	137.60 ± 47.99	138.90 ± 41.293	140.85 ± 53.88 (P>0.05) NS	136.65 ± 32.74	145.85 ± 25.60	151.9 ± 26.19	160.15 ± 26.70 (P<0.05) S	p > 0.05 NS
Blood Sugar Post Prandial (mg/dl)	209.65 ± 63.51	213.20 ± 75.07	209.55 ± 56.42	200.80 ± 66.05 (P>0.05) NS	201.15 ± 42.02	211.30 ± 43.54	216.80 ± 42.10	229.85 ± 40.14 (P<0.05) S	p > 0.05 NS

[S – Statistically significant, NS – Statistically not significant, ND – No Data]

Safety and Tolerability

There was no significant difference in mean values of haemoglobin, WBC count, total bilirubin, SGPT, SGOT, serum protein and serum albumin levels and lipid profile levels in both the groups [Table 7].

Table 7: Effect on Haemogram and Hepatic Functions.

	Trial Group		Placebo Group		P value between groups
Investigation	Base line	12 weeks	Base line	12 weeks	
Hemoglobin	12.76 ± 1.69	12.37 ± 1.49 (P>0.05) NS	12.03 ± 1.31	11.89 ± 1.30 (P>0.05) NS	p > 0.05 NS
WBC count	6990 ± 1645	6930 ± 1631 (P>0.05) NS	6690 ± 990	6800 ± 963 (P>0.05) NS	p > 0.05 NS
SGOT	31.00 ± 5.68	33.00 ± 7.67 (P>0.05) NS	32.40 ± 7.74	34.50 ± 5.99 (P>0.05) NS	p > 0.05 NS
SGPT	18.15 ± 7.01	21.45 ± 7.33 (P<0.05) S	29.50 ± 8.22	32.05 ± 6.94 (P>0.05) NS	p > 0.05 NS
S. Protein	7.32 ± 0.77	7.56 ± 0.47 (P>0.05) NS	6.78 ± 0.75	6.535 ± 0.55 (P>0.05) NS	p > 0.05 NS
S. Albumin	4.30 ± 0.47	4.52 ± 0.36 (P>0.05) NS	4.34 ± 0.47	4.28 ± 0.44 (P>0.05) NS	p > 0.05 NS
S. Bilirubin	0.64 ± 0.06	0.66 ± 0.059 (P>0.05) NS	0.67 ± 0.11	0.76 ± 0.08 (P<0.05) S	p > 0.05 NS

[S – Statistically significant, NS – Statistically not significant]

Significant increase was seen in high density lipid levels in treatment group from base line to 12 weeks. Statistical analysis done between groups showed insignificant difference [Table 8].

Table 8: Effect on Lipid Profile.

Investigation	Trial Group		Placebo Group		P value between groups
	Base line	12 weeks	Base line	12 weeks	
Serum Cholesterol	191.30 ± 33.06	197.35 ± 23.10 (P>0.05) NS	208.40 ± 17.50	234.95 ± 32.11 (P<0.05) S	p > 0.05 NS
Serum Triglycerides	128.55 ± 39.47	130.85 ± 42.87 (P>0.05) NS	159.35 ± 21.70	174.80 ± 22.30 (P<0.05) S	p > 0.05 NS
LDL	118.65 ± 30.38	120.60 ± 24.38 (P>0.05) NS	125.75 ± 19.90	138.70 ± 17.28 (P<0.05) S	p > 0.05 NS
HDL	46.95 ± 7.68	51.10 ± 6.98 (P<0.05)	42.60 ± 8.06	41.90 ± 8.31 (P>0.05)	p > 0.05 NS

		S		NS	
HDL: Cholesterol	4.09 ± 0.90	3.730 ± 0.68 (P>0.05) NS	3.84 ± 0.33	4.24 ± 0.36 (P<0.05) S	p < 0.05 S

[S – Statistically significant, NS – Statistically not significant]

Three patients from trial group and one from placebo reported of adverse events such as –Viral fever, upper Respiratory tract infection and knee Pain. These adverse events were found to be not related with study medication or procedure. No serious adverse events or adverse drug reaction was seen in either groups.

DISCUSSION

Number of Diabetics is increasing at rapid pace. Global prevalence of DM has nearly doubled in the last few decades, from 4.7% in 1980 to 8.5% in 2015.[6] Estimated number of diabetics was 415 million in 2015, which is likely to rise to 642 million by 2040.[7] As number of diabetics grow prevalence of its complication is bound to rise. It is estimated that about 20 to 40% patients of DM also suffer from Diabetic nephropathy.[8] DM along with nephropathy is associated with considerable morbidity and mortality due to its association of cardiovascular disease. It is also, a leading cause of end stage renal disease accounting for 42 % of renal replacement therapies.[8] Currently intervention for DN include optimum glycemic control, optimum blood pressure control, correction of hyperlipidaemia, protein restriction, use of angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blocker (ARB). In advanced cases dialysis or renal replacement therapy remain the only option, but both the treatments are associated with deranged quality of life for patient and high costs.[4] Use of ACE and ARBs is also associated with side effects such as – cough, angioedema, anaemia.[9] In such a scenario, medicines and therapies that can prevent and correct progression of DN, to the best possible levels, would be highly desirable.

Though some herbal medicines have been tested for their efficacy in DN, many mono herbal or poly herbal medicines remain largely unexplored,[10,11] Especially, medicines used in indigenous and classical texts and are known to have beneficial effects in renal diseases are worth exploring. Hence in the present study, herbal medicine such as Gokshura (T. terrestirs Linn.) which is easily available, widely practised in treatment of diseases related to urinary system (mutravaha srotasa) and DM (prameha) was selected. For use of standardized drug, maintaining the standard dose and easy palatability, it was decided to use the medicine in ghana tablets form. All ayurvedic principles were kept in mind while preparing the extract of the study medicine.

In the present study, the group treated with Gokshura ghana tablets showed significant reduction in mean protein loss through urine by 21 percent, while, in placebo it increased by 25 percent. Loss of protein from body is responsible for generalized fatigue, debility and dyspnoea on exertion. It is marker of unsatisfactory renal function. The study tries to establish the beneficial effects of Gokshura in Nephropathy. Similar results are observed about significant reduction in microalbuminuria in other study that included use of Basti (medicated enema) with oil medicated using Gokshura (T. terrestirs Linn.) and Punarnava (Boerhavia diffusa Linn.)[12]

Among the patients treated with Gokshura ghana tablets showed less deterioration of creatinine clearance (five percent) as compared to placebo (nine percent) over three months. Mean serum creatinine value in trial group increased by three percent while in placebo group significant increase was found (nine percent). Creatinine clearance is a marker of capacity of kidney to filter urine. Reduction in creatinine clearance levels shows decreasing filtration capacity of kidneys. Increase in the value of creatinine clearance is suggestive of increased capacity of kidneys. In the present study, either increase or constant level of creatinine clearance seen in majority of patients suggested possible slowdown of degeneration in kidneys.

Protective action of T. terrestirs on kidneys is proved in many studies. Extracts of T. terrestirs has shown decrease in renal epithelial damage, inflammation and restoration of glomerular morphology in oxalate induced oxidative stress in rats.[13] It has also shown nephro-protective action at various doses in cisplatin induced renal tissue damage [14].

In subjective analysis, symptoms namely anorexia (aruchi), loss of appetite (agnimandya), facial oedema (mukha shotha), pallor (panduta), weakness (daurbalya), scanty micturition (mutralpata) showed significant improvement in trial group as compared to placebo group. It shows usefulness of the drug under study in relieving of symptoms of Nephropathy.

No significant changes in the haemogram, blood sugar levels and hepatic functions were noticed. Though there were four AEs none of them were reported to be associated with study medicine suggesting the safety of the study medication over a period of 12 weeks in a dose of 1 gm four times a day.

Thus Gokshura (T. terrestris), which is a known medicine for diseases related with renal system according to ayurveda, has also shown positive effects when tested on parameters of modern medicine. Limitations of the study were – small sample size, single centric study in only urban population and less duration of study. Larger multi-centric, double blinded trial of

longer duration is required to show significant nephroprotective effect of Gokshura (T. terrestris).

CONCLUSION

The study concludes that consumption of Gokshura in a dose of 1 gm four times a day may help in in reducing protein loss and preserving renal functions. Patients receiving Gokshura (T. terrestris) ghana tablets showed stability in kidney function accessed by 24-hour urinary protein and creatinine clearance.

The present study is a pilot study on a small limited population for a duration of 12 weeks. Larger multi-centric, double blinded trial of longer duration may be further required to validate and establish nephroprotective of Gokshura (T. terrestris).

Registration: The study is registered in Clinical Trial Registry of India vide number CTRI/2017/05/008465 (date: 03/05/2017).

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