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PHYSICO – PHYTO CHEMICAL SCREENING AND ANTIUROLITHIATIC POTENTIAL IN ALBINO RATS FOR PEDALIUM MUREX L.

T. S. Bhuvaneswari*, T. Thirugnanam and V. Thirumurugan

PG & Research Department of Chemistry, A.V.V.M Sri Pushpam College (Autonomous) Poondi. Thanjavur, Tamilnadu-613 503.

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***Corresponding Author**
V.Thirumurugan
PG & Research Department of Chemistry, A.V.V.M Sri Pushpam College (Autonomous) Poondi. Thanjavur, Tamilnadu-613 503.

ABSTRACT

Kidney stone disease is a common disorder estimated to occur in approximately 12% of the population, with a recurrence rate of 70-81% in males, and 47-60% in females. Epidemiological data suggest that 60-80% of stone is composed mainly of calcium oxalate. The use of plant products with claimed uses in the traditional systems of medicine assumes importance. Urolithiasis is the condition where urinary calculi are formed or located anywhere in the urinary system or the process of forming stones in the kidney, bladder and ureters. *Pedalium murex.L* is a member of sesame family, Pedaliaceae. In English it is known as Bara-gokhru and in Tamil it is known as Anai-Nerinji. In this study organoleptic character, fluorescence characters, physico chemical studies, different extract values in various solvents, and qualitative phytochemical analysis are seen for the study plant *Pedalium murex.L.*Biochemical analysus in urine for calcium oxalate levels and on serum urea and creatinine levels on glycolic acid induced urolithiasis in albino rats are seen. The values are statistically expressed. The results are proven that study plant has antiurolithatic property which conforming claimed uses in the tradiational medicinal system.

KEYWORDS: *Padalium murex.L*, Physico-Phyto chemical screening, antiurolithiasis.

INTRODUCTION

Kidney stone disease is a common disorder estimated to occur in approximately 12% of the population, with a recurrence rate of 70-81% in males, and 47-60% in females. The majority of stones, up to 80% are composed mainly of calcium oxalate.[1,2] Kidney acts as a filter for

blood, removing waste products from the body and helping to regulate the levels of chemicals which are important for body functions. The urine drains from the kidney into the bladder through a narrow tube called the ureter. When the bladder fills and there is an urge to urinate, the bladder empties through the urethra, a much wider tube than the ureter.[3] Urolithiasis is a recurrent renal disease affects 4-8% in UK 15% in US and 11% in India. Epidemiological data suggest that 60-80% of stone is composed mainly of calcium oxalate. Stones formation occurs when urinary concentrations of stone forming salts, exceed the limit of metastability for that salt in solution. This most often reflects excessive excretion of one or more stone constituents, deficient inhibitory activity in urine, or simply a low urine volume resulting in excessively concentrated urine.[4] Many remedies have been employed during the ages to treat urinary stones. In the traditional systems of medicine, most of the remedies were taken from plants and they were proved to be useful though the rationale behind their use is not well established through systematic pharmacological and clinical studies except for some composite herbal drugs and plants. Pharmacotherapy can reduce the recurrence rate. The use of plant products with claimed uses in the traditional systems of medicine assumes importance.[5] *Pedalium murex.L* is a member of sesame family, Pedaliaceae. It is found in different part of the world such as tropical area, Srilanka, India, Mexico and Pakistan. In India, it occurs mainly in the Western and Corommandal coasts as weed of waste places.[6,7] It is about 15 to 40 cm in height, having four angle spiny brownish colour fruits (1-2 cm). The fruits are rich in flavonoids, sapogenin (diosgenin-0.06%) and soluble proteins (20.14mg/ym).[8,9]An infusion extract prepared using cold water from the leaves, stems and fruits of *Pedalium murex L.* is demulcent, diuretic and also found to be useful in the treatment of disorders of urinary systems such as gonorrhea, dysuria, incontinence of urine, etc.[10,11] *Pedalium murex* is an important medicinal plant that contains several alkaloids like pedalitin, diosmetin, dinatin, pedalin dinatin-7-glucuronide.[12] The leaf decoction is used to control white discharge due to excessive body heat. Root decoction is used as an antibilious agent, while the juice of the fruit is used as an emmenagogue and to promote lochial discharge.[13] The decoction of the seeds and glycosides obtained from it showed mild diuretic activity and the alcoholic extract of the fruits reduced blood pressure in dog and rat.[14] It is reported that many Indian medicinal plants show beneficial effects against renal injury.[15] The present investigation aims to give data highlihghting physico phyto chemical screening and on glygolic acid urolithiasis in albino rats for *Pedalium murex.L* antiurolithiatic activity. This may help investigators to identify and develop appropriate lead compounds or plants products beneficial in management of urolithiasis.[16]

MATERIAL AND METHODS

Plant collection and identification

The medicinal plant namely *Pedalium murex.L* (Pedaliaceae) is selected for the present study. The plants are collected from Gnanam Nagar, Thanjavur. The plant is identified and authenticated by Rapinat herbarium, St.Joeseph College, (Autonomous) Trichy, Tamilnadu.

The fresh leaves are shade dried and ground using mechanical motor at the PG and Research Department of chemistry, A.V.V.M Sri Pushpam college poondi, Thanjavur. The powdered material (50gm) is transferred into a Soxhlet apparatus containing 200ml of respective solvents (Hydro alcoholic, Chloroform, Water and Ethyl acetate). The extract is concentrated to dryness under vacuum desiccators. The extracts obtained are stored and later used for organoleptic characters, fluorescence study. Preliminary physic-chemical, phyto- chemical, extractive values and anti- Urolithiatic potential of the plant.

Systematic position

Family	:	Padaliaceae
Genus	:	*Pedalium*
Species	:	*Murex.L*

The botanical nomenclature of this plant is Padalium murex L.

Various vernacular names:

English name	:	Bara-gokhru
Tamil name	:	Anai-Nerinji
Telugu name	:	Enugu-Palleru
Kannada name	:	Annegalu -gida
Hindi name	:	Bara-gokhru

Statistical analysis

Results are expressed as mean ± standard error of mean (S.E.M.). Statistical significance was determined by one way analysis of variance (ANOVA) and post hoc least significant difference (LSD) test. The data obtained for urolithiasis using student's paried t test. P <0.01 thanP< 0.05 were consider significant.

Figure 1: *Pedalium murex.L* in its natural habit.

RESULT AND DISCUSSION

The organolapetic character *Pedalium murex.L* leaf powder colour is sandal. The odour is unpleasant, taste is pungent and texture is fine Powder, which is shown in Table-1.

Table 1: Data on organoleptic characters of *Pedalium murex.L* leaf Powder.

S.no	Characters	Pedalium murex l.
1	colour	leaf powder sandal in color
2	odour	Unpleasant
3	taste	Pungent
4	texture	Fine powder

Fluorescent study of *Pedalium murex.L* leaf powder is shown in Table-2. The powder of study plant is treated with different reagents like 1N sodium hydroxide, 1N Hydrochloric acid and 50% Sulphuric acid.[17]

The colour variations are seen at daylight and UV light at 365nm. In the daylight sample as such and with different reagents shown brown color and in UV light the light green color to dark green color. There is no much significant variation in day light and UV light. The fluorescence study is useful in plant study analysis to access preliminary quality of raw drug sample.

Table 2: Data on Fluorescence studies of *Pedalium murex.L* leaf powder.

S.no	characters	day light	uv light at 365 nm
1	Sample as such	Brown	Green
2	Sample+1N sodium hydroixde	Brown	Dark green
3	Sample+ 1N Hydrochloric acid	Brown	Light green
4	Sample+ 50% Sulphuric acid	Brown	Dark green

In table 3 the various physico chemical characters on the hydro alcoholic extract of *Pedalium murex L.* is shown in Table-3. The moisture content value is 0.016g. Since the value is less, it is less prone to microbial contamination. So the plant matrials can be saftely stored in bulk. The purpose of carryout all physo chemical characteristics are to monitor and check adulteration of raw drugs.

Table 3: Physico chemical studies on the hydro alcoholic extract of *Pedalium murex L.*

S.No	CHARACTERS	*Pedalium murex.L*
1	Total ash	0.169g
2	Water soluble ash	0.070g
3	Acid insoluble ash	0.024g
4	Sulphated ash	0.082 g
5	Moisture content	0.016g

- **For 1 g of the sample**

Different extractive value in various solvent like hydro alcohol, water, benzene, ethyl acetate and chloroform are shown for the study plant in Table-4. The hydro alcoholic extract value is very high that is 0.720g for 5 g of the sample. This indicates the polar solvent has more capacity in extracting the majority of the phyto constituents.

Table 4: The *Padalium murex L.* showing different extract values in various solvents.

S.No	CHARACTERS	*Pedalium murex L.* LEAF EXTRACT
1	Hydro alcohol	0.720g
2	Water	0.638g
3	Benzene	0.424g
4	Ethyl acetate	0.513g
5	Chloroform	0.502g

Estimation Values for 5g of the sample

Qualitative phyto chemical screening of *Pedalium murex L.* leaf powder on different solvent extracts is shown in Table-5. Alkaloids carbohydrate, flavonoids, tannins terpenoids and proteins are more are less shown their presence in all extracts. whereas saponins and gums & mucilage are absent.

Table 5: Qualitative phyto chemical analysis of *Pedalium murex.L* Leaf powder on different solvent extract.

S.No	Phyto constituents	Hydroalcohol	Water	Benzene	Ethyl Acetate	Chloroform
1	Alkaloids	(+)	(+)	(+)	(+)	(+)
2	Carbohydrate	(+)	(+)	(-)	(-)	(-)
3	Flavanoids	(+)	(+)	(+)	(+)	(+)
4	Saponins	(-)	(-)	(-)	(-)	(-)
5	Tannins	(+)	(+)	(-)	(-)	(-)
6	Terpenoids	(+)	(+)	(+)	(+)	(+)
7	Gum and mucilage	(-)	(-)	(-)	(-)	(-)
8	Protein	(+)	(-)	(-)	(-)	(-)

(+) Indicates Presence, (-) Indicates Absence

LD_{50} value of the hydro alcoholic extract of the study plant by acute toxicity is shown in table- 6. Its value is >2000 (mg/kg) body weight.

Table 6: LD_{50} Value of hydro alcoholic extract of the plant (by oral route).

Test Compound	LD $_{50}$ Value (mg / Kg)
Pedalium murex. L Leaf Powder	>2000

Bio chemical analysis like calcium, oxalate total number of calcium oxalate deposit and percentage of protection in urine samples of albino rats are shown in Table-7.

Group-I which serves as control rats receives normal pellet.
Group-II serves as a 1% glycolic acid induced rats.
Group-III Hydro alcoholic extract *Pedalium murex.L* 100mg/kg treated rats.
Group-IV Hydro alcoholic extract of *Pedalium murex.L* 200mg/kg treated rats.
Group-V standard drugs cystone 10mg/kg treated rats.

The calcium values (mg/dl) in group-II is 2.07, in group-III is 1.40 and in group-IV is 1.17 Similarly the oxalate values also reduces from 2.41 to 1.02 for extract treated animals.

The percentage of protection for 100mg/kg extract treated animal is 45.35mg/dl and 58.17 mg/dl for 200mg/kg study plant extract treated animals. The standard cystone percentage of prodection is 69.49. The values clearly indicate the study plant has a capacity in reducing calcium oxalate stones in the urine sample of the experimental rats.

Table 7: Bio Chemical analysis in Urine.

S.No	Group	Calcium (mg/dl)	Oxalate (mg/dl)	Total number of calcium oxalate deposits/ 100x field	% of protection
1	Group I (vehicle)	0.67±0.05	0.53±0.04		
2	GroupII 1% glycolic acid	2.07±0.21	2.41±0.08	20.13±0.28	
3	Group III *Pedalium murex.L* (100mg/kg)	1.40±0.05*	1.62±0.03*	11.00±0.72*	45.35
4	Group IV *Pedalium murex.L* (200mg/kg	1.17±0.04**	1.02±0.07**	8.42±0.04**	58.17
5	Group V Cystone (10mg/kg)	0.98±0.03**	0.89±0.06**	6.14±0.09**	69.49

The values are expressed in Mean± Standard Deviation (n=6) P<0.01;*P<0.05**

In Table -8 effect of study plant extract in serum and urea on glucose induced urolithiasis is shown. The urea values (mg/kg) for group-II is 58.40 for group-III 47.16, group-IV 40.72 and group-V 39.08 similarly the creatinine values (mg/dl) are decreased after giving plants extracts. Group-II has value 2.11, group-III 1.73, group-IV 1.37 and group-V 0.92. These values indicate that study plant *Pedalium murex.L* has great effect in controling urolithiasis. The values are also dose dependent. Both urea and creatinine values are near to the standard value.

Table 8: Extect Of Extract On Serum Urea And Creatinine On Glycolic Acid Induced Urolithiasis.

S.No	Group	Urea(mg/dl)	Oxalate (mg/dl)
1	Group I (vehicle)	32.11±0.21	0.61±0.03
2	GroupII 1% glycolic acid	58.40±0.34	2.11±015
3	Group III *Padalium murex*.L (100mg/kg)	47.16±083*	1.73±0.09*
4	Group IV *Pedalium murex*.L (200mg/kg	40.72±052**	1.37±0.14**
5	Group V Cystone (10mg/kg)	39.08±027**	0.92±0.06**

Values are expressed in Mean±Standared Deviation (n=6) P<0.01: *P<0.05**

CONCLUSION

The study plant *Pedalium murex L.* found to posses important phyto constituents like alkaloids, flavonoids, tennerious, terepenoids etc. The kidney stone study in glycolic induced albino rats confirms the study plant posses antiurolithiatic property. The results confirmed claimed uses in the traditional medical system.

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