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In *vitro* and In *Vivo*Pharmacological evaluation of *mimosa pudica* leaf and root extract for antinephrolithiatic activity

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Abstract

The growth of crystals in the urinary tract is known as urolithiasis. Mimosa pudica L. is used as a diuretic and to cure kidney stones in Ayurveda and other traditional medicine systems. The goal of the current investigation was to assess the anti-urolithiatic activity of Mimosa pudica L. extracts in rats that had been experimentally induced to develop urolithiaticbehaviour, despite the lack of scientific evidence to support this activity.

Method- Sodium oxalate incited urolithiasis model in the rodent was utilized to survey the impact of oil ether remove Mimosa pudica. The examination is intended to discover the impact of concentrates of Mimosa pudica on restorative utilization against sodium oxalate incited urolithiasis. All rodents was housed in metabolic pens independently for the whole term of the investigation. The urine of each rodent was gathered on seventh day after 6 hrs of sodium oxalate infusion with Thymol as an (additive) and serum of each rodent would be gathered. Assessment of biochemical boundaries viz Urea, Uric corrosive, Creatinine, Sodium, Chlorides and Potassium in serum and urine will be finished. Helpful groups were relinquished on seventh day. Their correct kidney was inspected for the presence of calcium oxalate gems and stone development by histological procedures.

Result - The presence of crystals in the urine, elevated blood levels, and lowered urine levels of biochemical markers such urea, creatinine, sodium, potassium, and chlorides are signs of crystal deposition.The outcomes validated Mimosa pudica's beneficial impact on urolithiasis and supported the traditional Ayurvedic usage of this herb as an anti-urolithiatic medication.

Keywords: Anti-urolithiatic activity, Mimosa pudica, Sodium oxalate, Hyperoxaluria, Kidney stones.

GROUP TREATMENT (Root Extract)

Group-1 Receive Saline (1 ml/kg)

Group-2 Receive Sodium oxalate (7mg/100g,in)

Group-3 Receive Sodium oxalate+vehicle (7 mg/100g, ip)

Group-4 Receive Sodium oxalate+Cystone (7 mg/100g, ip + 500mg/kg,p).

Group-5 Receive Sodium oxalate+ Ether extract. (250mg/kg)

Group-6 Receive Sodium oxalate+Ether extract. (500mg/kg)

Group-7 Receive Sodium oxalate+ Ethanolic extract. (250mg/kg)

Group-8 Receive Sodium oxalate +Ethanolic extract. (500 mg/kg)

Group-9 Receive Sodium oxalate +Aqueous extract. (250 mg/kg)

Group – 10 Receive Sodium oxalate +Aqueous extract. (500 mg/kg)

1. Introduction

Nephrolithiasis, or kidney stones, is another name for urolithiasis. Calculi in the urinary tract is known as urolithiasis. Up to 6% of women and up to 15% of men suffer from renal stone disease(Alelign et al., n.d.). Calculi are made up of calcium (either phosphate or oxalate) in 80% of cases; the remaining calculi are made of struvite, uric acid, or cystine1(Ramello et al., n.d.). An estimated 12% of the population has a kidney stone at some point in their lifetime, and about 1 million Americans get kidney stones annual((Das et al., 2019)).

It is estimated that 0.1–0.4% of people in the USA and Europe get kidney stones annually; in Asia, 8–15% of people get renal stones, and 20% of people in Saudi Arabia get them at some point in their lives(Cimen et al., n.d.). Men and older adults are more likely to get kidney stones. Over 50% of individuals often experience a recurrence of the disease within ten years(Lakshmi & Devaraj, 2017). These days, the primary crystalline components of around 80% of kidney stones are calcium salts, such as calcium phosphate or calcium oxalate. Owing to the fact that human urine is frequently supersaturated in both uric acid and calcium salts, crystalluria—the condition in which healthy individuals excrete up to ten million microcrystals daily—is quite prevalent. Large crystal aggregates that serve as the building blocks for stones can form because recurrent stone formers appear to secrete less crystallisation inhibitors or crystallisation inhibitors in structurally deficient forms(Jorg et al., 2023). As an alternative, stone formers may improve crystal adherence to urothelial surfaces.

2. Material and Method

2.1. Collection of plant

The whole plant with leaves, root, and stem are collected from the local botanical garden and sector 9 area of Bhilai city.

2.2. Preparation of extract: -

Oil ether extricate, ethanolic separate, will be acquired by progressive soxhlet extraction. The marc acquired subsequent to alcoholic extraction was macerated by means of water to get a watery concentrate(A.Mariappan*, 2016).

2.3. Animals

Male Wistar albino rats weighing 150e to 200 g were purchased fromanimal house. They were housed in acryl fiber cages at 23 ± 2 _C, humidity 50 ± 1% and were kept on a 12 h light/dark cycle. They were fed with standard chow feed (Amrut laboratories) and water ad libitum and acclimatized for 15 days before the study. Experimental protocol reported in this study was approved by the Institutional Animal Ethical Committeeof CPCSEA, Govt. of India and carried out in accordance with OECD guidelines(A.Mariappan*, 2016).

2.3. Chemicals

All chemicals were purchased from Himedia Lab (Mumbai) and Loba Chemie(Mumbai) respectively. Reference drug Cystone was purchased fromHimalaya Herbal Healthcare, Bangalore. Demineralized water andanalytical grade chemicals/solventswere procured fromlocalmarket.

2.4. Detection of Proteins and Amino Acids

2.4.1Preparation of Test Solution: The test solution will be prepared by dissolving the extract in water(Patel et al., 2011).

MillonsTest

The extracts will be treat with 2 ml of Millon's reagent. The configuration of white precipitate, which turns to red upon heating, shows the participation of proteins.

Biuret Test

The concentrates will be treated with 1ml of 10% sodium hydroxide clarification and warmed. A drop of 0.7% copper sulfate arrangementto the on top of mixtures be added. The development of a purplish violet colour indicates the existence of proteins(Brckner& Schieber, 2001).

NinhydrinTest

To the extracts, 0.25% ninhydrin reagent was added and boiled for a only some minutes. development of blue colour indicates the occurrence of amino acid.

2.5. Acute oral toxicity

Intense harmfulness concentrate for the ether, ethanolic, watery concentrate of *Mimosa pudica L*. will

be finished by the OECD rules No: 423 and, medium and high portion will be chosen for treatment(Eredics et al., n.d.; Şam et al., 2023; Sharma et al., n.d.; SINGH et al., 2023).

Method: -

The overnight abstained rodents will be isolated into 04 gatherings, each gathering comprising of 3 female creatures. The EBR will be given in different portions (5, 50,300,2000) by gastric hatching with a needle. After the organization of the concentrate, the creature will be watched ceaselessly for the initial 2 hours in addition to at 24 hrs in the direction of recognize changes in social reactions and for quakes, spasm, salivation, loose bowels, torpidity, rest, and trance-like state and will be checked as long as 14 days for the harmful side effects and mortality

2.6. Evaluation of antinephrolithiatic activity

2.6.1Ethylene glycol induced nephrolithiasis

Ethylene glycol incited hyperoxaluria technique will be utilized to evaluate the counter urolithiasis movement in pale skinned person Wistar rodents. Creatures were isolated into 6 gatherings of 6 creatures each. All the exploratory creatures aside from typical control got ethylene glycol (0.75%) in drinking water for 28 days and a solitary portion of sodium oxalate infusion (35 mg/kg,i.p) on fourteenth day for enlistment of urolithiasis. Rodent has a place with treatment bunch co-directed with removes at the portion of 100,200 and 300 mg/kg b.wt, p.o from first to 28th day, Animals has a place with standard gathering got cystone 500 mg/kg, p.o. ((A.Mariappan*, 2016; Eredics et al., n.d.; Lakshmi & Devaraj, 2017; Patel et al., 2011; Saleem et al., 2021; Şam et al., 2023; Sharma et al., n.d.; SINGH et al., 2023; Suvarchala Reddy et al., 2021))

Grouping

Group, I: Control group rodents will get typical saline

Group II: Administered with ethylene glycol (0.75%) + Sodium oxalate infusion (35mg/kg ,i.p)

Group III: Administered with ethylene glycol and treated with watery concentrate at 100 mg/kg, p.o

Group IV: Administered with ethylene glycol and treated with ethanolic remove at 200 mg/kg, p.o

Group V: Administered with ethylene glycol and treated with oil ether remove at 300 mg/kg, p.o

Group VI: Administered with ethylene glycol and treated with cystone 500 mg/kg, p.o 24-hour urine tests will be gathered on fourteenth and 24thday by lodging rodents at individual metabolic pens utilizing sodium azide as the additive

2.6.2 Sodium oxalate induced nephrolithiasis

Sodium oxalate incited urolithiasis model in the rodent will be utilized to survey the impact of oil ether remove Mimosa pudica. The examination is intended to discover the impact of concentrates of Mimosa pudica on restorative utilization against sodium oxalate incited urolithiasis(Eisner et al., 2013; Paterson et al., n.d.; Van Cangh et al., 2007).

GROUP	TREATMENT
Group-1	Receive Saline (1 ml/kg)
Group-2	Receive Sodium oxalate (7mg/100g,in)
Group-3	Receive Sodium oxalate+vehicle (7 mg/100g, ip)
Group-4	Receive Sodium oxalate+Cystone (7 mg/100g, ip + 500mg/kg,p).
Group-5	Receive Sodium oxalate+ Ether extract. (Medium dose)
Group-6	Receive Sodium oxalate+Ether extract. (High dose)
Group-7	Receive Sodium oxalate+ Ethanolic extract. (Medium dose)
Group-8	Receive Sodium oxalate +Ethanolic extract. (High dose)
Group-9	Receive Sodium oxalate +Aqueous extract. (Medium dose)
Group – 10	Receive Sodium oxalate +Aqueous extract. (High dose)

All rodents will be housed in metabolic pens independently for the whole term of the investigation. The urine of each rodent will be gathered on seventh day after 6 hrs of sodium oxalate infusion with Thymol as an (additive) and serum of each rodent will be gathered. Assessment of biochemical boundaries viz

Urea, Uric corrosive, Creatinine, Sodium, Chlorides and Potassium in serum and urine will be finished. Helpful groups will be relinquished on seventh day. Their correct kidney will be inspected for the presence of calcium oxalate gems and stone development by histological procedures. (Anand R. *et al* 1994,(Bhuvaneswari & Krishnakumari, 2012; Elmas et al., 2016; Ghule et al., 2019; Powell et al., 2008; Ravi et al., 2004))

Precious stone statement is reviewed as evaluation '0' – no testimony of gems, grade '1' – mellow affidavit of gems, grade '2'- moderate affidavit of gems and grade '3'- higher measure of calcium oxalate gems in the kidney.

Diuretic activity for the extracts which will show good anti-urolithiasis will be done which is one of the possible mechanism of action for the anti- urolithiatic activity

2.6.3 Calcium oxalate induce nephrolithiasis

Group I: 1ml of calcium oxalate (1mg/ml) + 1ml of distilled water

Group II: 1ml of calcium oxalate (1mg/ml) + 1ml of Cystone solution (400mg/ml)

Group III: 1ml of calcium oxalate (1mg/ml) + 1ml of hot aqueous extract of *mimosa pudica* (20mg/ml)

Group IV: 1ml of calcium oxalate (1mg/ml) + 1ml of hot ethanolic extract of *mimosa pudica* (20mg/ml)

Group V: 1ml of calcium oxalate (1mg/ml) + 1ml of hot ether extract of *mimosa pudica* (20mg/ml).(Himayama H *et. al* 2001, (Muhammad et al., 2016))

2.7 Analysis of urine

Urine tests will be gathered from all the creatures. Urea, Uric corrosive, Creatinine, Sodium, potassium and Chloride content were resolved. Urine will axis to pool the precious stones and saw under a light electron magnifying lens at 5X or 10X. Size and state of gems will be watched and announced.Serum analysis:

After the exploratory period, the animal's shell surrendered by cervical execution under narcotic conditions and blood was accumulated from the retro-orbital.Serum was isolated by centrifugation at 10,000 rpm for 10 min and examined for urea, uric corrosive, creatinine, sodium, potassium and chloride. (Kahn HD *et. al* 1933*)*

2.8. Histopathology

At that point the areas of the kidney will be seen under a magnifying lens for histopathological changes in kidney engineering and their photomicrographs were taken.

The mid-district would cut open to kill either kidney from each animal. Isolated kidneys will clear off unessential tissue and defended in 10% impartial formalin.One of the disconnected kidneys will at that point installed in paraffin utilizing an ordinary strategy and cut into 5 μm thick segments and recolored utilizing hematoxylin-eosin color lastly mounted in diphenyl xylene. At that point the segments will be seen under a magnifying instrument for histopathological changes in kidney engineering and their photomicrographs were taken.Various concentration of ion will be measured by autoanalyzer(Medicine & 2023, 2023; Times & 2023, 2023; Yang et al., 2023)

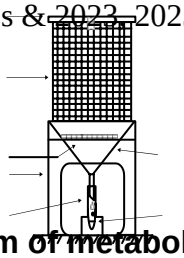


Fig.1: Schematic diagram of metabolic cage for urine collection

2.9. Estimation of ions like sodium, potassium, chloride creatinine

Configure the Auto-analyzer device using the kit's included parameters. As directed by the protocol, prepare the working, standard, and test solutions. Incubate at room temperature for 5 minutes. Blend and measure at 550 nm(Feng et al., n.d.; Hashemi et al., n.d.; Karakuş et al., 2016).

2.10Analysis of statistics

2.11ANOVA was used to statistically examine the data produced by the different factors, and Student Newman Keul's test was conducted using Graph Pad Prism programme (GraphPad software Inc., Version 4.0.0.255). For every parameter, the mean values ± SEM were computed. The analysis

focused on the changes in biochemical parameters caused by the plant extracts treated groups in comparison to the calculi induced group, taking into account the 100% difference in biochemical parameters between the standard drug treated group and the calculi induced group. The significance level was maintained at $P<0.05$.

3. Result and Discussion

3.1 Identification of the plant by botanist

*Mimosa pudica*Linn was collected from the surrounding villages of Bhilai and local botanical garden in the month of Aug-Sept 2020. The plant was identified and authenticated by Dept. of Botany; Govt. R. R. D. S. College Khairagarh Dist. Rajnandgaon(C.G).

3.2 Toxicity study

Acute oral toxicity was carried out according to OECD guidelines. All extract were safe up to 2000mg/kg.

3.3 The activity against Nephrorolithiasis

3.1.1 pH and urine production

When sodium oxalate (7 mg/100 g, i.p.) was administered, there was a minor drop in urine production when compared to the untreated group and a substantial ($P<0.001$) drop in urine pH when compared to the saline-treated group. When compared to the group that was just administered sodium oxalate, the administration of PEMPL (250 and 500 mg/kg), EEMPL, EEMPR (250 and 500 mg/kg), AEMPL, AEMPR (250 and 500 mg/kg), and cystone (500 mg/kg) resulted in a considerably higher urine production and pH. When compared to the NaOx alone treated group, the administration of PEMPR 250 and 500 mg/kg does not significantly alter the volume or pH of the urine. (Table Number- 1)

Table no: 1. Effect of Mimosa pudica leaves and rooextracts on urine output and pH in sodium oxalate inducedurolithiasis

Sr.No.	GROUP	VOLUME OF URINE	pH OF URINE
1	**Normal (Saline)**	3.0 ± 0.36	7.63 ± 0.08
2	**Control**	2.0 ± 0.37	6.61 ± 0.15
3	**Cystone 500mg/kg**	4.7*** ± 0.23	8.76*** ± 0.07
4	**PEMPL 250mg/kg**	4.2*** ± 0.08	7.40*** ± 0.04
5	**PEMPL 500mg/kg**	4.1*** ± 0.15	7.72*** ± 0.08
6	**EEMPL 250mg/kg**	4.1*** ± 0.08	7.44*** ± 0.09
7	**EEMPL 500mg/kg**	4.7*** ± 0.13	7.69*** ± 0.08
8	**AEMPL 250mg/kg**	5.6*** ± 0.17	7.51*** ± 0.08
9	**AEMPL 500mg/kg**	5.7*** ± 0.14	7.71*** ± 0.05
10	**PEMPR 250mg/kg**	2.0 ± 0.16	6.51 ± 0.02
11	**PEMPR 500mg/kg**	2.1 ± 0.14	6.60 ± 0.02
12	**EEMPR 250mg/kg**	4.0*** ± 0.32	6.90** ± 0.12
13	**EEMPR 500mg/kg**	4.2*** ± 0.12	7.30*** ± 0.02
14	**AEMPR 250mg/kg**	4.7*** ± 0.12	7.48*** ± 0.07
15	**AEMPR 500mg/kg**	5.5*** ± 0.16	7.58*** ± 0.02

Values are Mean ± S.E.M. (n=6); Significance valuesare
***$P < 0.001$ and **$P < 0.01$. Control group vs all groups

3.1.2 Impact of root and leaf extracts from Mimosa pudica on components of urine and serum in opposition to sodium oxalate-induced urolithiasis.

Impact on the concentration of creatinine: Significant increases in serum creatinine concentration and significant decreases in urine creatinine were seen after a 10-day administration of sodium oxalate (7 mg/100g, i.p.). When compared to the group treated with sodium oxalate alone, the pretreatment with PEMPL (250 and 500 mg/kg body weight), EEMPR (250 and 500 mg/kg), AEMPL, AEMPR (250 and 500 mg/kg), and standard drug cystone (500 mg/kg) for 10 days increased creatinine clearance, which in turn caused a significant reduction in serum creatinine concentration. Although EEMPL (250 and 500 mg/kg) raised creatinine clearance, serum creatinine did not significantly alter. Serum creatinine concentration and creatinine clearance did not significantly vary according to PEMPR. (Table nos. 2 & 3)

3.1.3 IMPACT ON UREA CONCENTRATION: Ten days of sodium oxalate (7 mg/100 g i.p.) treatment dramatically decreased the amount of urea in the urine and increased the level of urea in the serum in the control animals. Urine urea elimination was considerably increased after 10 days of pretreatment with PEMPL (250 and 500 mg/kg), EEMPL, EEMPR (250 and 500 mg/kg), AEMPL, AEMPR (250 and 500 mg/kg), and cystone (500 mg/kg) as opposed to the NaOx alone treated group. However, while there was no discernible change in the serum urea content, both PEMPR doses led to an increase in urea clearance.(Table 2 & 3)

3.1.4 EFFECT ON CONCENTRATION OF URIC ACID: Compared to the saline-treated group, the control animals' elimination of uric acid was significantly higher in the sodium oxalate (7 mg/100g, i.p.) treated group after 10 days. When compared to the alone NaOx treated group, pretreatment with PEMPL (250 and 500 mg/kg), EEMPL, EEMPR (250 and 500 mg/kg), AEMPL, AEMPR (250 and 500 mg/kg), and cystone (500 mg/kg) significantly decreased urine uric acid concentration and serum level of uric acid. PEMPR had no discernible impact on the level of uric acid in either the serum or the urine. (Table 2 & 3, respectively)

3.1.5 EFFECT ON SODIUM CONCENTRATION:

Administration of sodium oxalate (7mg/kg, i.p) for 10 days significantly reduced elimination of sodium and increased serum sodium concentration in NaOx alone treated group compared to normal one. Administration of PEMPL (250 and 500

mg/kg), EEMPL, EEMPR (250 and 500 mg/kg), AEMPL, AEMPR (250 and 500 mg/kg) and cystone (500 mg/kg) for 10 days showed significant increase in sodium elimination and reduction in serum sodium concentration when compared to control group while lower dose of PEMPR (250 mg/kg) showed significant change in the concentration of sodium in urine but no change in the concentration of sodium in serum and higher dose of PEMPR (500 mg/kg) treated group didn't showed significant change in the concentration of sodium in serum and urine. (Table 2 & 3 respectively)

3.1.6 EFFECT ON CHLORIDE CONCENTRATION: When compared to the saline treated group, the sodium oxalate (7 mg/kg, i.p.) treated group showed a significant decrease in urine chloride concentration and a rise in serum chloride concentration over ten days. Whereas PEMPR did not significantly affect urine or serum chloride levels, pretreatment with PEMPL (250 and 500 mg/kg), EEMPL, EEMPR (250 and 500 mg/kg), AEMPL, AEMPR (250 and 500 mg/kg), and Cystone (500 mg/kg) significantly increased chloride elimination in urine and significantly reduced serum chloride concentration when compared to the NaOx alone treated group. and (Table 2 & 3)

3.1.7 POTASSIUM CONCENTRATION: Sodium oxalate (7 mg/100 g i.p.) was administered for 10 days, and during that time, the potassium levels in the urine and serum were considerably lowered and raised, respectively. When compared to the control group, pretreatment for 10 days with PEMPL (250 and 500 mg/kg), EEMPL, EEMPR (250 and 500 mg/kg), AEMPL, AEMPR (250 and 500 mg/kg), and cystone (500 mg/kg) markedly increased potassium excretion and dramatically decreased serum potassium level. However, when comparing the two PEMPR doses to the control group, there was no discernible difference in the effect on serum and urine potassium levels. and (Table 2 & 3)

Sr. No	Group		Creatinine Mg/dl	Urea Mg/dl	Uricacid Mg/dl	Sodium mEq/L	Potassium mEq/L	Chloride mEq/L
1	**Normal (Saline)**		6.01 ± 0.12	70.02 ± 2.21	2.53 ± 1.61	141.87 ± 0.61	60.07 ± 2.16	89.45 ± 1.21
2	**Control**		2.02 ± 0.18	48.05 ± 2.0	3.42 ± 0.13	71.08 ± 1.08	31.57 ± 1.39	31.02 ± 1.10
3	**Cystone 500mg/kg**		a 7.52 ± 0.15	a 79.06 ± 0.71	a 1.02 ± 0.11	a 160.74 ± 0.74	a 72.05 ± 0.80	a 103.09 ± 1.60
4	**PEMPL 250mg/kg**	**Leaves**	a 6.09 ± 0.10	a 65.05 ± 0.63	a 2.02 ± 0.18	a 130.95 ± 1.62	a 47.50 ± 1.21	a 85.15 ± 1.50
5	**PEMPL 500mg/kg**		a 6.72 ± 0.23	a 67.04 ± 0.61	a 2.60 ± 0.16	a 129.47 ± 1.88	a 42.92 ± 1.41	a 91.94 ± 1.40
6	**EEMPL 250mg/kg**	**Leaves**	a 4.42 ± 0.16	a 60.04 ± 1.60	b 2.71 ± 0.06	a 134.91 ± 1.70	a 52.00 ± 3.66	a 78.08 ± 1.00
7	**EEMPL 500mg/kg**		a 5.43 ± 0.16	a 68.03 ± 2.22	c 2.91 ± 0.07	a 132.90 ± 0.71	a 62.27 ± 2.20	a 95.21 ± 1.10
8	**AEMPL 250mg/kg**	**Leaves**	a 6.32 ± 0.12	b 62.04 ± 1.83	a 2.01 ± 0.13	a 130.50 ± 0.69	a 68.37 ± 1.10	a 92.54 ± 1.20
9	**AEMPL 500mg/kg**		a 6.04 ± 0.01	a 68.03 ± 0.69	a 2.21 ± 0.10	a 138.64 ± 1.60	a 68.05 ± 2.25	a 88.15 ± 1.00

Sr. NO	Group		Creatinine Mg/dl	Urea Mg/dl	Uricacid Mg/dl	Sodium mEq/L	Potassium mEq/L	Chloride mEq/L
10	**PEMPR 250mg/kg**	**Root**	2.40 ± 0.01	b 45.04 ± 1.00	2.01 ± 0.16	81.89 ± 1.00	33.05 ± 1.20	35.72 ± 1.40
11	**PEMPR 500mg/kg**		2.56 ± 0.10	b 54.03 ± 0.84	2.02 ± 0.18	82.56 ± 1.22	32.51 ± 1.69	33.51 ± 1.40
12	**EEMPR 250mg/kg**	**Root**	a 4.74 ± 0.10	a 54.04 ± 0.69	a 2.07 ± 0.05	b 121.39 ± 2.80	a 45.00 ± 1.21	a 41.04 ± 1.00
13	**EEMPR 500mg/kg**		a 5.02 ± 0.35	a 68.06 ± 0.97	a 2.10 ± 0.02	a 138.08 ± 1.70	a 48.00 ± 0.70	a 94.98 ± 1.30
14	**AEMPR 250mg/kg**	**Root**	a 6.88 ± 0.03	a 65.03 ± 0.99	a 1.21 ± 0.10	a 149.70 ± 2.00	a 64.84 ± 3.40	a 88.42 ± 1.11
15	**AEMPR 500mg/kg**		a 8.41 ± 0.18	a 84.07 ± 0.04	a 1.72 ± 0.09	a 122.54 ± 1.30	c 30.52 ± 2.90	a 81.55 ± 0.75

Values are Mean ± S.E.M. (n=6); Significance values are (a) ****P* < 0.001, (b) **P < 0.01 and (c) *P < 0.05.
Control group vs all groups.

Table no: 2. Effect of *Mimosa pudica*leaves and root extracts on urinary parameterers against sodium oxalate induced urolithiasis

Sr. No	Group		Creatinine Mg/dl	Urea Mg/dl	Uricacid Mg/dl	Sodium mEq/L	Potassium mEq/L	Chloride mEq/L
1	**Normal (Saline)**		0.70 ± 0.01	44.03 ± 0.63	2.14 ± 0.06	119.50 ± 1.60	3.45 ± 0.19	41.21 ± 1.19
2	**Control**		0.84 ± 0.01	51.04 ± 0.83	3.53 ± 0.12	203.62 ± 4.10	5.31 ± 0.44	52.85 ± 3.78
3	**Cystone 500mg/kg**		a 0.61 ± 0.10	a 29.00 ± 0.70	a 1.41 ± 0.09	a 112.45 ± 0.93	a 2.11 ± 0.06	a 37.19 ± 1.20
4	**PEMPL 250mg/kg**	**Leaves**	b 0.66 ± 0.01	a 32.81 ± 0.37	a 1.90 ± 0.01	a 116.71 ± 1.53	a 2.92 ± 0.17	a 33.23 ± 1.60
5	**PEMPL 500mg/kg**		b 0.25 ± 0.01	a 32.08 ± 0.33	a 1.34 ± 0.03	a 111.18 ± 1.03	a 3.29 ± 0.44	a 34.53 ± 2.79
6	**EEMPL 250mg/kg**	**Leaves**	0.91 ± 0.01	a 38.04 ± 1.62	a 2.01 ± 0.18	a 99.81 ± 1.57	a 2.81 ± 0.10	a 39.26 ± 1.14
7	**EEMPL 500mg/kg**		0.83 ± 0.01	b 43.01 ± 1.58	b 2.10 ± 0.03	a 108.62 ± 1.87	b 3.71 ± 0.15	b 40.99 ± 1.19
8	**AEMPL 250mg/kg**	**Leaves**	a 0.70 ± 0.01	a 38.02 ± 1.12	a 1.70 ± 0.02	a 93.95 ± 1.57	a 3.22 ± 0.34	a 22.64 ± 1.45

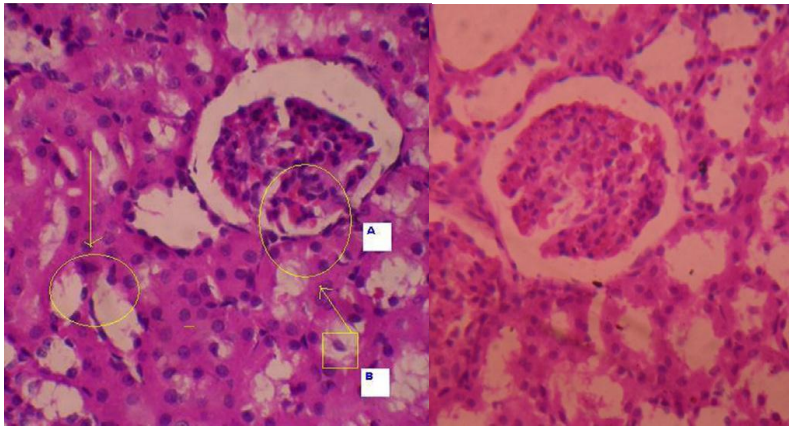
9	**AEMPL 500mg/kg**		a 0.73 ± 0.10	a 40.03 ± 0.71	a 1.69 ± 0.01	a 102.77 ± 1.89	b 3.64 ± 0.28	a 32.55 ± 1.30
Sr. NO	**Group**		**Creatinine Mg/dl**	**Urea Mg/dl**	**Uricacid Mg/dl**	**Sodium mEq/L**	**Potassium mEq/L**	**Chloride mEq/L**
10	**PEMPR 250mg/kg**	**Root**	0.73 ± 0.01	44.05 ± 2.02	c 2.11 ± 0.14	c 181.79 ± 0.77	5.02 ± 0.43	51.93 ± 1.31
11	**PEMPR 500mg/kg**		0.95 ± 0.01	50.01 ± 2.73	c 3.20 ± 0.06	192.54 ± 4.00	5.62 ± 0.44	52.92 ± 3.63
12	**EEMPR 250mg/kg**	**Root**	a 0.75 ± 0.01	a 32.89 ± 0.15	a 1.60 ± 0.14	a 101.75 ± 1.88	a 3.34 ± 0.32	a 34.75 ± 1.35
13	**EEMPR 500mg/kg**		a 0.81 ± 0.02	a 40.83 ± 0.01	a 1.70 ± 0.01	a 121.82 ± 3.89	a 3.70 ± 0.15	b 44.36 ± 1.20
14	**AEMPR 250mg/kg**	**Root**	a 0.80 ± 0.02	a 35.30 ± 0.10	a 1.74 ± 0.01	a 115.42 ± 2.86	a 3.14 ± 0.14	a 22.33 ± 1.81
15	**AEMPR 500mg/kg**		c 0.67 ± 0.00	b 33.03 ± 1.12	a 2.01 ± 0.16	a 128.84 ± 2.60	a 3.12 ± 0.26	a 34.34 ± 2.90

Values are Mean ± S.E.M. (n=6); Significance values are (a) ***$P < 0.001$, (b) **$P < 0.01$ and (c) *$P < 0.05$.
Control group vs all groups.

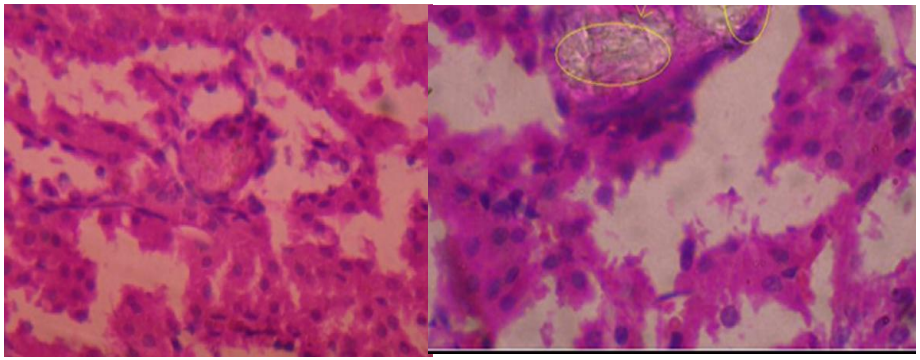
Table no: 3. Effect of *Mimosa pudica*leaves and root extracts on serum parameterers against sodium oxalate induced urolithiasis

3.5. Histopathological study

Kidneys of all animals harvested after 28 days were subjected tohistopathological studies. The sections of kidneys of treated rats with Samples has shown deposition of micro crystals of calciumoxalate (A and C)in cortex region whereas in the kidney section of the treatedgroups, the crystal deposition was significantly less(B and D) .There was no significant tubular damage, hemorrhage, disruptedbrush border and tubular congestion in the kidney sections(cortex) of the rats treated with quercetin and botulin comparedwith the kidney sections of disease induced animals.



A B



C D

4. Conclusions

The goal of the current study was to assess the anti-urolithiatic activity of petroleum ether, alcoholic, and aqueous extracts of Mimosa pudica leaves and roots in rats using a model of sodium oxalate-induced urolithiasis.

In the rat model used for the studies, which was induced by sodium oxalate, the petroleum ether extract (250 and 500 mg/kg p.o.) of the leaves, the alcoholic extract (250 and 500 mg/kg p.o.), and the aqueous extract (250 and 500 mg/kg p.o.) of the leaves and root of Mimosa pudica demonstrated significant anti-urolithiatic activity. These extracts also demonstrated significant diuretic activity.

Based on these initial studies, it can be said that while the petroleum ether extract of the root of Mimosa pudica does not exhibit anti-

urolithiaticactivity, the alcoholic, aqueous, and petroleum ether extracts of the leaves and root have strong anti-urolithiatic properties. To characterise the active ingredients in charge of the anti-urolithiatic effect, however, fractions from the extracts must be separated and their anti-urolithiatic activity must be assessed.

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