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# EVALUATION OF DIURETIC ACTIVITY OF *TRICHODESMA INDI*CUM R.BR. IN RATS

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## ABSTRACT

The plant *Trichodesma indicum* R.Br. is easily available and distinctly used in inflammation. Whole plant is used as diuretic, as an emollient poultice, as a cure for fever, in ear pain. This study was undertaken to carry out pharmacological studies on aerial parts of plant. Methanolic extract and aqueous extract of aerial parts of *Trichodesma indicum* were used for screening diuretic activity using Lipschitz model. Diuretic activity, in view of urine volume, the methanolic extract at dose of 300 mg/kg has significant diuretic activity with lipschitz value 1.25 as compared to standard. Urinary sodium concentration was found to be more in methanolic extract but potassium was found to be more in aqueous extract. It also shows that, methanolic extract has effect like $K^+$ sparing diuretics. It has also saluretic activity. In conclusion, *Trichodesma indicum* R.Br. possess significant diuretic activity these actions of *Trichodesma indicum* R.Br. can be attributed to Phytoconstituents present in it.

**KEYWORDS:** ***Trichodesma indicum*** **R.Br. Boraginaceae, Diuretic activity, Lipschitz test, Rats.**

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# INTRODUCTION

*Trichodesma indicum* R.Br. (Boraginaceae) is a hispid, erect, or diffuse annual herb with single pale blue flower, changing to pink or white. The herb is found as a weed throughout the greater part of India, on roadsides and stony dry wastelands. In Ayurveda, the plant is beneficial for diseases of the eye, in ear pain; it is also prescribed for expulsion of the dead foetus.[1] The whole plant and root are reportedly used to treat arthritis, anorexia, dysentery, skin diseases, snakebite poisoning, and fever.[2] The root is pounded into a paste and is applied to reduce swellings, particularly of the joints; the extract is given to children suffering from dysentery and fever.[3,4] The plant is useful in vitiated conditions of *Vata* and *Kapha*, arthralgia, inflammations, dyspepsia, diarrhea, dysentery, leprosy and skin diseases.[5] Some of the chemical constituents of the plant have been identified as non-steroidal compounds; hexacosane, ethyl hexacosanoate and 21,24-hexacosadienoic acid ethyl esters from leaves[6] and oleic, linoleic, palmatic, stearic and linolenic acid from seed oil.[7] The methanol extract of the whole plant of *Trichodesma indicum* has shown significant cough suppressant activity in Swiss Albino mice.[8] Traditionally the whole plant is used as diuretic also as an emollient poultice. However, systemic and exhaustive information is lacking.[9-10] Anti-inflammatory activity of plant is proved[11] by the experimental model yet diuretic activity is not proved by the experimental model on animal. This study was undertaken to carry out pharmacological studies on aerial parts of plant. Methanolic and aqueous extract of aerial parts of plant were used for screening of diuretic activity. It was therefore thought worthwhile to carry out Pharmacological studies with special emphasis on diuretic activity on this plant. In the present communication we report the diuretic activity of the plant extracts.

# MATERIALS AND METHODS

### *Plant material*

Fresh and fully grown plants of *Trichodesma indicum* were collected from medicinal plant garden of A.R. college of Pharmacy, Vallabh Vidyanagar of Gujarat State in the month of October-November. The plant was authenticated by Dr. Bhanu Kakrani, Lecturer, Dept. of Botany, Tolani College of Arts & Science, Adipur (Kutch) and voucher specimen LMM/Ti-1/37/ARGH-11 was deposited to Department of Pharmacognosy of A.R. College of Pharmacy.

### *Preparation of plant extracts*

The aerial parts of plant were washed with distilled water to remove dirt and dried under shade. The material was powdered to 60# separately and stored in airtight containers and used for further studies. 1000 g of powdered plant was soaked in methanol and water for percolation at room temperature for 7 days. After filtration, the solvents were removed. For the evaluation methanolic and aqueous extract (7.5% each) were administered by oral route at 150 or 300 mg/kg, body weight of the animal in a final volume in 0.9% saline.

### *Experimental animals*

Adult female wistar rats weighing 250 - 400 gm were used for study. Six animals per group were placed in metabolic cages. The rats were fed with standard diet (Altromin®pellets) and water *ad libitum*. Fifteen hours prior to the experiment food and water were withdrawn. The experimental procedures described were approved by the Institutional Ethics Animal committee and also by CPCSEA. CPCSEA certified the protocol number CPCSEA/IAEC/ARCP/10-11/09 for this study and the protocol was submitted to Department of Pharmacognosy of A.R. College of Pharmacy. The animals were procured from Zydus Research centre, Changodar, Ahmedabad.

### *Chemicals*

Furosemide (Sigma chemicals, Germany), Urea (Sigma Chemicals, Germany), Methanol (Merck Germany)

### *Evaluation of Diuretic activity of plant extracts*

### *Lipschitz test*[12-18]

A method for testing diuretic activity in rats has been described by Lipschitz et al (1943).The test is based on water and sodium excretion in test animals and compared to rats treated with a high dose of Urea and Furosemide. The "Lipschitz Value" is the quotient between excretion by test animals and excretion by urea control.

### *In vivo study*

Female wistar rats weighing 250 - 400 gm were used. Six animals per group were placed in metabolic cages provided with a wire mesh bottom and a funnel to retain faeces and to allow the urine to pass. The rats were fed with standard diet (Altromin®pellets) and water *ad libitum*. Fifteen hours prior to the experiment food and water were withdrawn. Group A animals received normal saline (0.9% NaCl) 25ml/kg i.e control, Group B animals received Furosemide (100mg/kg), Group C animals received Urea (1 mg/kg), Group D animals received Water extract of plant (150mg/kg), Group E animals received Methanolic extract of plant (150mg/kg), Group F animals received Water extract of plant (300mg/kg), Group G animals received Methanolic extract of plant (300mg/kg). Before treatment animals received physiological saline (0.9% NaCl) at an oral dose of 5ml/100g body weight to impose a uniform water and salt load. All the drugs were freshly prepared prior to administrations. As per group they were administered with saline and dose of drug and urine excretion was recorded after 5 – 6 hour and at 24 hour. The sodium and potassium contents in the urine were estimated by ICP (inductive coupled plasma) spectrometer for assessing diuretic activity. The chloride content in the urine was also estimated by ion exchange chromatography for assessing saluretic activity.

## RESULTS AND DISCUSSION

### *Diuretic activity of plant extracts*

Diuretic activity of methanolic and aqueous extracts of aerial parts of *Trichodesma indicum* R.Br. was carried out using Lipschitz's Test using Wistar rats. Both extracts were investigated for their activity at different dose levels and urine collected after 5-6 hr and at 24 hour was measured. The sodium, potassium, and chloride content in urine were estimated by inductive coupled plasma (ICP) and ion exchange chromatography. Lipschitz's value for each extract was also calculated. The results of diuretic effects of Methanolic and aqueous extracts by LIPSCHITZ'S TEST method are shown in Table 1. Histogram of comparison of urine volume vs. treatment is shown in Fig.1.

**Table 1**
***Diuretic activity of methanolic and aqueous extracts of aerial parts of Trichodesma indicum R.Br.***

| Group | Dose in mg/kg (P.O.) | Urine volume ( ml/24 hour) | Lipschitz value | Concentration of ions (mEq/litre) | | |
|---|---|---|---|---|---|---|
| | | | | $Na^+$ | $K^+$ | $Cl^-$ |
| Control (normal saline) | 25 ml/kg | 1 | - | 62.5 | 11.6 | 57 |
| Standard 1 (Furosemide) | 20 | 4 ± 0.057* | 2 | 93.7 | 13.5 | 101.7 |
| Standard 2 (Urea) | 1 | 2 ± 0.106* | 1 | 66.5 | 12.8 | 70.9 |
| Methanolic extract | 150 | 1.9 ± 0.036** | 0.95 | 67.8 | 12.9 | 63.5 |
| | 300 | 2.5 ± 0.057** | 1.25 | 83.7 | 11.8 | 70.3 |
| Aqueous extract | 150 | 1.25 ± 0.042** | 0.63 | 33.5 | 13.5 | 50.1 |
| | 300 | 1.5 ± 0.0577** | 0.75 | 63.5 | 13.1 | 46.8 |

*n = 6 in each group number of rats in each group done by one way analysis of variance followed by Dunett's test.*
*All value are expressed as mean ± SEM *P< 0.05, significant as compare to control,*
***P< 0.001 more significant as compared with standard*

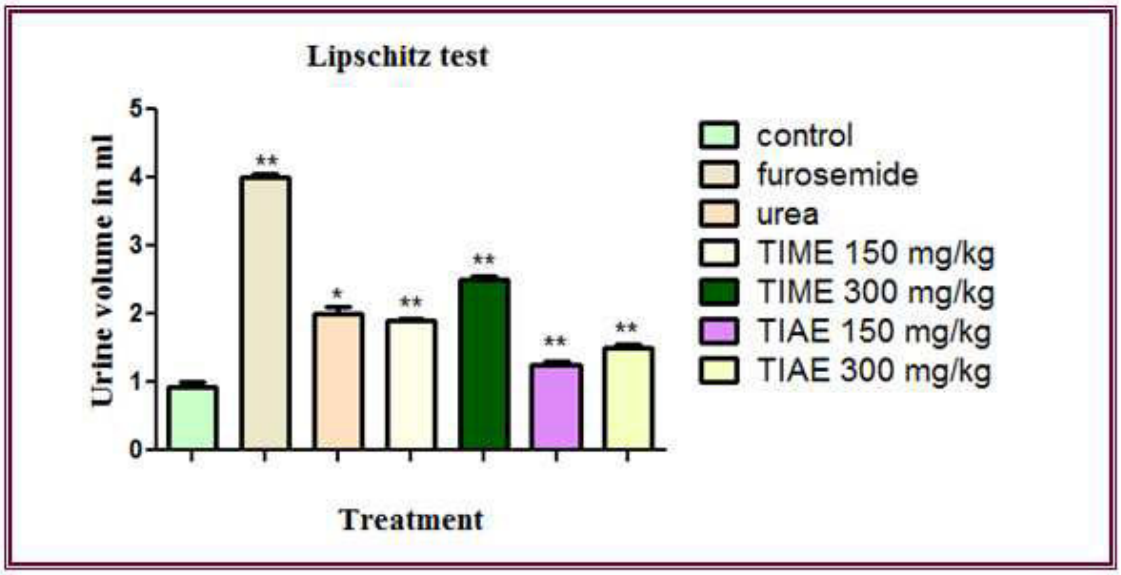


**Figure 1**
***Histogram showing comparison of urine volume in ml vs. Treatment***

From Table 1 it can be concluded that the methanolic extract at high dose (300mg/kg) has Lipschitz value more than 1, so it has positive effect. In view of urine volume, all extracts have positive effect and the methanolic extract at dose of 300 mg/kg has highest diuretic activity with Lipschitz value 1.25 which is near to Lipschitz value of furosemide. While aqueous extract at dose of 150 mg/kg has lowest diuretic activity with Lipschitz value 0.63. In general methanolic extract has significant diuretic activity as compared to standard and it has higher diuretic activity as compared to water extract. In view of urinary electrolyte concentration, sodium concentration was found more in methanolic extract but potassium concentration was found more in aqueous extract though methanolic extract has high Lipschitz value than aqueous extract. These findings suggest that methanolic extract has effect like $K^+$ sparing diuretics. As it increases the excretion of chloride that is 70.3 mEq/litre, it has also a saluretic activity.

## CONCLUSION

Treatment with methanolic extract (150 and 300 mg/kg) and aqueous extract (150 and 300

mg/kg) of aerial parts of *Trichodesma indicum* R.Br. show significant ($p \leq 0.001$) Diuretic activity as compared to standard. After considering overall data from experimental studies it can be concluded that, *Trichodesma indicum* R.Br. possess significant diuretic activity which may be useful in the treatment of acute pulmonary oedema, chronic heart failure, ascites, nephrotic syndrome, and renal failure. The active compound in the extract responsible for the diuretic activity needed to be identified. In future, the plant extract containing active compound can be explored for detailed pharmacological activity and if the result are promising then, it can be exploited commercially.

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