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SODIUM AND WATER EXCRETORY POTENTIAL OF FLOWER EXTRACT OF *TECOMA STANS*

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ABSTRACT

The present study was undertaken to explore the diuretic outcome of methanolic extract of the flower petals of *Tecoma stans* in rats. Methanolic extract of *Tecoma stans* [METS] was administered to investigational rats orally at the doses of 50 and 100 mg/kg p.o. Hydrochlorothiazide [10 mg/kg] was used as positive control in the study. The diuretic upshot of the extract was evaluated by measuring urine volume, sodium and potassium content. Urine volume was drastically increased by methanolic extract in contrast to the control group, while the excretion of sodium was also increased by extract. The methanolic extract had the further benefit of a potassium-conserving effect. It is concluded that methanolic extract of *Tecoma stans* fashioned notable diuretic effect which appeared to be comparable to that produced by the reference diuretic Hydrochlorothiazide. The current study provides a quantitative basis for illumination the folkloric use of *Tecoma stans* as a diuretic agent.

KEY WORDS: Diuretic activity, Hydrochlorothiazide, Potassium, *Tecoma stans*.

INTRODUCTION

Since the time immemorial our conventional system of medicine and tradition claiming that medicinal plants as a whole or their parts are being used in all types of diseases fruitfully [1]. About 65% of world populations have admittance to local medicinal plant knowledge system [2]. Traditional systems of medicine are well-liked in developing countries and up to 80% of population relies on traditional medicines or folk remedies for their primary health care needs [3]. India has about 45000 plant species and among them, several thousands have been claimed to possess therapeutic properties [4]. Diuretics are drugs that augment the rate of urine flow, sodium excretion and are used to fiddle with the volume and composition of body fluids in a assortment of clinical situations. Drug induced diuresis is beneficial in many life threatening disease conditions such as congestive heart failure, nephritic

syndrome, cirrhosis, renal failure, hypertension and pregnancy toxemia [5]. Most diuretic drugs have the adverse effects on quality of life including impotence, fatigue and weakness [6]. Herbal medicines are in great demand in the developed as well as developing countries for primary health care because of their wide biological and medicinal activities, higher wellbeing margins and lesser costs [7]. Indian ayurvedic system is rich in treating renal problems [8].

Tecoma stans [common name yellow bell] also known as yellow trumpet bush belongs to the family bignoniaceae. It is an ornamental plant. It is an erect, branched, sparingly hairy or nearly smooth shrub two to four meters in height. The leaves are opposite, odd-pinnate, Up to 20 centimeters in length with 5 to 7 leaflets. The leaflets are lanceolate to oblong- lanceolate, 6 to 13 centimeters long, pointed at both ends and toothed on the

margins. Trumpet shaped flowers are yellow faintly scented and borne in short, dense, terminal clusters. The calyx is green. 5 to 7 millimeters long and 5 toothed. Flowering can begin as early as April and continue in to fall. The flowers are followed by 6 inch long, tan pods that are filled with small, papery winged seeds.⁹

Leaves of *Tecoma stans* contain the alkaloids tecomin and tecostamine are potent hypoglycaemic agent when given intravenously. Anthranilic acid is responsible for the anti diabetic activity. Roots are powerful diuretic and vermifuge¹⁰. *Tecoma* is not a toxic because this plant is used in latine America as a remedy for diabetes and moreover for feeding cattle and goats in mexico¹¹. The preliminary phytochemical screening of methanolic extract of flower extract of *Tecoma stans* showed the presence of flavaniods, phenol, alkaloids, tannins, steroids, triterpenes, anthraquinones and saponins etc. There is no report on the diuretic studies of the methanolic extract of dried flowers of *Tecoma stans*, so far, though it is used in folk medicine. Thus it was considered worthwhile to take up such an investigation in detail. The present study was therefore aimed to explore the diuretic effects of methanolic extract of the flowers of *Tecoma stans*.

MATERIALS AND METHODS

Collection and extraction of plant

The flowers of *Tecoma stans* were collected in the month of May 2011 from Rasipuram [Namakkal District] Tamil Nadu. A herbarium specimen of the plant was deposited in the Department of Pharmacognosy. The plant was identified by Dr.G.V.S.Murthy, Joint Director of the Botanical Survey of India, Southern circle, TNAU Campus, Coimbatore, who authenticated the plant from information available in the literature. The flower petals were dried in the shade for 10–12 days. After complete drying, the flower petals were pulverized to a coarse powder of 40 mesh size in a mechanical grinder. The powdered material was subjected to sohxlet extraction for 18 h at 50–55°C. The extract was thereafter concentrated under vacuum and air-dried [12-14].

Animals

Adult male Wistar rats, each in the weight range of 180–200g, were obtained for this study. Animals were randomly allocated to six treatment groups of 6 animals each and kept in cages and housed under standard conditions of temperature, humidity and dark light cycle [12h–12h]. They were provided with regular rat chow and distilled water *ad libitum*.

Experimental protocol

Diuretic activity was determined by the following methods of Kau *et al.*, [15] with minor modifications. The rats were randomly divided into four groups of six animals each as follows: first group served as Control given with 5 ml/kg bw of de-ionized water; second group served as

standard gro up treated with hydrochlorothiazide – 10 mg/kg bw; third and fourth group animas were treated with METS at the dose of 50 mg/kg bw and 100 mg/kg bw respectively. In all cases, the volume of the dose was administered 5 ml/kg body weight. The animals were fasted overnight [18 h] prior to the test but with free access to tap water only and then were given an oral loading of normal saline [0.9%] of 0.05 ml per g body weight. Immediately after administration, the rats were paired and placed in metabolism cages. Urine was collected in a graduated cylinder and its volume was recorded at 2 h intervals for 8 h. Cumulative urine excretion was calculated in relation to body weight and expressed as ml/100 g b.w.

Measurement of Urine Output and Analysis of Electrolytes

Na⁺ and K⁺ concentrations were measured using flame photometer [Toshniwal, Model TCM- 35]. The instrument was calibrated with standard solutions containing different concentrations of Na⁺ and K⁺.

Statistical Analysis

The results are expressed as mean values \pm S.E.M. [standard error of mean] for pairs of rats. Statistical comparison was carried out by analysis of variance [ANOVA]. The difference between the means of treated groups and the non-treated control group was evaluated by the Bonferroni Multiple Comparisons. The results were considered statistically significant when $P < 0.05$.

RESULTS AND DISCUSSION

The results of the evaluations carried out on the extracts are listed below in the tables. Urinary volume [ml/100g/8h] and diuretic index was given in the table 1, while electrolyte [Na⁺ and K⁺] content [Mequiv /100 g/8h] were given in the Table 2

Urine volume

Reference diuretic, HCTZ, increased urine volume (Table 1). The extract also caused an increase in urine volume. For METS, the increase at doses of 50 mg/kg body weight and 100 mg/kg body weight increases the urine volume significantly at the dose dependent manner [$P < 0.01$], [$P < 0.001$] respectively, compared to the control group.

Electrolyte excretion

Only 100 mg/kg of the METS produced a significant increase in Na⁺ excretion [$P < 0.001$] when compared to the control group. Only HCTZ produced significant increases in potassium excretion. No previous pharmacological or clinical study has been carried out to test the diuretic activity of this plant. Methanolic extract of flowers of *Tecoma stans* shows a dose-dependent increase in urine excretion. The METS [100 mg/kg] shows an increase in urine volume. Thus, the diuretic effect of extract

Table 1. Effect of METS and HCTZ on urine volume, diuretic index

Treatment	dose [mg/kg]	Urine Volume [ml/100g/hr]	Diuretic Index
Control	-	3.65 ± 0.11	-
Hydrochlorothiazide	10	6.38 ± 0.16***	1.7479
METS	50	4.51 ± 0.11**	1.2356
METS	100	5.60 ± 0.11***	1.5342

** $p < 0.01$ and *** $p < 0.001$ compared with the control group [Bonferroni Multiple Comparisons Test]. Diuretic index = volume treated group / volume control group.

Table 2. Effect of METS and HCTZ on sodium and potassium excretion in urine

Treatment	Dose [mg/kg]	Sodium [meq./100g/8 hr] ×10-2	Potassium [meq./100g/8 hr] ×10-2
Control	-	55.26 + 0.84	18.22 + 0.14
Hydrochlorothiazide	10	92.30 + 0.24***	30.45 + 0.64***
METS	50	61.10 + 0.49	18.82 + 0.54
METS	100	79.46 + 0.88***	19.80 + 0.22

** $p < 0.01$ and *** $p < 0.001$ compared with the control group. [Bonferroni Multiple Comparisons Test].

indicates an increase in both water excretion and excretion of sodium. METS [100 mg/kg] shows a significant result in excretion of water & sodium, [Table 2], which proves as a strong diuretic agent, but active constituent responsible for the diuretic effect cannot be concluded on the basis of this study. The preliminary phytochemical investigation reveals

the presence of various phytoconstituents, especially alkaloids, which can be responsible for diuretic activity. Further study is under process to find the exact phytoconstituents responsible for the action also to find out the possible mechanism of action.

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