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DIURETIC ACTIVITY OF ROOT AND BARK OF *ERYTHRINA INDICA* LAM.

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ABSTRACT

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Purpose: The present study was undertaken to investigate diuretic effect of aqueous and methanol extracts of the dried seeds of *erythrina indica* in normal rats.

Method: Aqueous and methanol extracts of *erythrina indica* seeds were administered to experimental rats orally at doses of 25 and 30 ml/kg p.o. Furosemide (10 mg/kg) was used as positive control in the study. The diuretic effect of the extracts was evaluated by measuring urine volume, sodium and potassium content, conductivity and chloride content.

Result: Urine volume was significantly increased by the two doses of aqueous and methanol extracts from root and bark of *erythrina indica* in comparison to control group. While the excretion of sodium was also increased by both extracts, potassium excretion was only increased by the aqueous extract at a dose of 25 ml/kg. There was no significant change in the conductivity and pH of urine after administration of the *erythrina indica* extracts. The diuretic effect of the extracts was comparable to that of the reference standard (Furosemide).

Conclusion: We can conclude that aqueous and methanol extracts of *erythrina indica* produced diuretic effect. Present study provides a quantitative basis for explaining the diuretic use of *erythrina indica* as a diuretic agent.

INTRODUCTION: *Erythrina indica* is a medium-sized, spiny, deciduous tree normally growing to 6-9 m (occasionally 28 m) tall and 60 cm. Young stems and branches are thickly armed with stout conical spines up to 8 mm long, which fall off after 2-4 years; rarely, a few spines persist and are retained with the corky bark. Bark smooth and green when young, exfoliating in papery flakes, becoming thick, corky and deeply fissured with age. Leaves trifoliate, alternate, bright emerald-green, on long petioles 6-15cm, rachis 5-30 cm long, prickly; leaflets smooth, shiny, broader than long, 8-20 by 5-15 cm, ovate to acuminate with an obtusely pointed end. Leaf petiole and rachis are spiny, flowers in bright pink to scarlet erect terminal racemes 15-20 cm long; stamens slightly protruding from the

flower. Fruit a cylindrical torulose pod, green, turning black and wrinkly as they ripen, thin-walled and constricted around the seeds. There are 1-8 smooth, oblong, dark red to almost black seeds per pod. *Erythrina* comes from the Greek word 'eruthros' meaning red, alluding to the showy red flowers of the *Erythrina* species. It is used traditionally for the treatment of liver trouble, joint pain, dysentery, convulsion, as a diuretic, laxative and an Anthelmintic¹⁻³. A perusal of literature revealed that its diuretic effects remain to be studied. Herein, we report the diuretic effect of the ethanol, chloroform, and ethyl acetate extract of leaves of *Erythrina indica* in albino rats.

MATERIALS AND METHODS: The plant materials used in this study, roots of *H. esculentus* were collected from the field in Khandala Tal. Shrirampur, Dist Ahmednagar identified by Dr. A. K. Mohite R.B.N.B College, Shrirampur, India. A voucher specimen of the collected sample was deposited in our institutional herbarium for the reference.

Preparation of the Extract: The air dried leaves were pulverized in to coarse particle and extracted exhaustively with Ethanol, Chloroform and Ethyl acetate by cold maceration for 16 days. These extracts were concentrated under reduced pressure and preserved in desiccator for further use. The preliminary phytochemical analysis^{4, 5} were carried out to find out the phytoconstituents present in the crude extracts.

Diuretic Activity: Albino rats of both sexes (150-250g) were collected and housed under standard laboratory conditions. They were fed with standard rat feed and water *ad libitum*. The experimental protocols were approved by institutional animal ethics committee (Approval no. 509/02/C/CPCSEA/2002). The method of Lipschitz *et al.*,⁶ was employed for the evaluation of diuretic activity. The animals were divided in to five groups (six in each) deprived of food and water for 18h prior to the experiment. On the day of experiment, Group I animals received normal saline (20 ml/kg.

p.o.), the Group II animals received furosemide (20mg/kg. i.p.), the Group III, IV and V animals received Ethanol, Chloroform and Ethyl acetate extracts (250 mg/kg) respectively. Immediately after the administration, the animals were kept in metallic cages (two per cage) specially designed to separate urine and fecal matter and kept at room temperature (20±0.5°C). The total volume of urine was collected at the end of 5h. During this period no water and food was made available to the animals. The parameters accounted for ascertaining the diuretic activity are total volume of urine and the urine concentration of Na⁺, K⁺ and Cl⁻. The Na⁺ and K⁺ were measured by flame photometry⁷ and Cl⁻ concentration was estimated by titration⁸ with silver nitrate solution (N/50) using 3 drops of potassium chromate as indicator. The student 't' value was employed for statistical analysis. All the values expressed are Mean± S.E.M. *P*< 0.05 (Compared to control) was considered

RESULT AND DISCUSSION: The preliminary phytochemical analysis showed the presence of flavonoids, carbohydrates and glycosides in all the three extracts (Ethanol, Chloroform and Ethyl acetate). All these extracts at 250mg/kg showed increase in urine volume and also the concentration of Na⁺, K⁺ and Cl⁻ in urine (**Table 1**). It was previously reported that the flavonoids, glycosides are endowed with diuretic activity.

TABLE 1: DIURETIC ACTIVITY OF ETHANOL, CHLOROFORM AND ETHYL ACETATE EXTRACTS OF ROOT OF *ERYTHRINA INDICA* LAM TREATMENT

Treatment	Dose	Total urine Total	Total Na ⁺ (μmoles/kg)	Total K ⁺ (μmoles/kg)	Total Cl ⁻ (μmoles/kg)
Normal saline	25 ml/kg. p.o.	10.5±0.67	56.27±0.26	32.52±0.5	650.92±0.59
Furosemide	20 mg/kg. i.p.	21.5±0.27*	60.45±0.92*	56.58±0.7	1913.45±0.82*
Ethanol extract	250 mg/kg. i.p.	25.6±0.36*	55.76±0.86*	45.69±0.52*	1106.57±0.93*
Chloroform extract	250 mg/kg. i.p.	21.9±0.54*	36.65±0.69*	30.83±0.96*	1046.59±0.67*
Ethyl acetate extract	250 mg/kg. i.p.	23.2±0.43*	25.47±0.56	27.61±0.50*	1026.97±0.27*

The diuretic effects of extracts are indicated by increase in both water excretion and excretion of sodium and potassium. The active principles responsible for the diuretic effects of the extracts of this plant have not yet been elucidated but preliminary phytochemical analysis of the extracts revealed the presence of polar compounds such as flavonoids and steroids. A previous investigation of the composition of *Erythrina indica* Lam. has suggested the presence of flavonoids and steroidal compounds¹⁰. It may be suggested that these substances might be responsible,

at least in part, for the observed diuretic activity and that they may act individually or synergistically. Previous studies have demonstrated also that there are several compounds which could be responsible for the plants diuretic effects such as flavonoids, saponins or organic acids¹⁶. The effect may be produced by stimulation of regional blood flow or initial vasodilation¹⁷, or by producing inhibition of tubular reabsorption of water and anions¹⁸, the result in both cases being diuresis.

The increased sodium and water excretion activity also provides strong basis for its proved anti-hypertensive action.

CONCLUSION: The results obtained in this study provide a quantitative basis to explain the traditional folkloric use of *Erythrina indica* Lam. as a diuretic agent, it is also used for the treatment of hypertension and renal disease¹¹, but to the best of our knowledge, no previous pharmacological or clinical study has been carried out to test the diuretic activity of this plant. Both the aqueous and methanol extract of *Erythrina indica* Lam. showed a dose-dependent increase in urine excretion. With respect to the aqueous extract, the maximum increase in urinary excretion was produced at 100mg/kg with a value of 49.89% compared while them ethanol extract (100mg/kg) showed an increase of 41.05 % grouping urine volume. The specific conductivity, which is an indirect

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