

**Study on the Diuretic Activity of *Gossypium Herbaceum* Linn  
Leaves Extract in Albino Rats**

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**Summary**

Medicinal plants play a paramount role in the new era of modern medicine. Numerous medicinal plants and their formulations are used for various disorders in ethno medical practices as well in the traditional system of medicine in India. The diuretic activity of ethyl acetate and alcohol extract of *Gossypium herbaceum* Linn leaves was investigated in male wistar albino rats. The both extracts were administered at graded doses of 100&200 mg/kg body weight. The parameters which were taken into account during the experimental on each rat were; total urine volume, body weight before and after the experiment and the concentration of sodium, potassium and chloride ions in urine. The total urine volumes of the both extracts (200mg/kg) treated rats were evaluated nearly two folds compared with the control. Excretion of cations (sodium& potassium ions) and anions (chloride ions) also increased significantly with respect to the control group. The diuretic effect was comparable with that of the standard drug Frusemide. The increase of cat ions in the urine on the treatment with ethyl acetate and alcohol extract of *Gossypium herbaceum* Linn leaves was dose dependent. This effect supports alcoholic extract showed significant activity than the ethyl acetate extract as a diuretic.

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### **Introduction**

*Gossypium herbaceum* Linn (pratti) *Gossypium obtusifolium* Roxb (syn) (The wealth of India, 1999) belongs to the family Malvaceae (Vidyaratnam P.S. Varier, 1995) is described in Ayurvedic Pharmacopoeia of India as annual or perennial shrubs 2 to 8 feet height, thick and rigid stems. The leaves are sparsely hairy, rarely glabrous, flat, cleft, up to half into 3-7 lobes. Lobes ovate, rounded, only slightly constricted at the end. The plant is widely distributed throughout western India, Africa, Middle East countries, central Asia and graded availability is found in Iran, Afghanistan & Russian Turkistan. The Ethno-botanical studies and folklore's claiming revealed that the *Gossypium herbaceum* Linn has used in various therapeutic properties such as diuretic, haematinic, laxative, astringent, bronchitis, anti dysenteric, expectorant, in action and it is also used in ayurvedic formulations (The Indian Materia Medica). The leaves, flowers, fruits, and seeds of this plant has been claimed to be useful in various ailments from literature survey. From thorough survey and earlier studies showed that plant has not been studied for diuretic activity. Hence, in the present study the ethyl acetate and alcohol extracts were examined for its diuretic effect.

### **Experimental design**

#### **Plant material:**

The plant specimen for proposed study was collected from Karimangalam, Dharmapuri dist, Tamilnadu, India and it was identified by Dr. P. Jeyaraman, Ph. D, Director, Plant Anatomy Research Centre (PARC), Sakti Nagar, West Tambaram, Chennai. The leaves of *Gossypium herbaceum* Linn were dried under shade, powdered by a cutter mill and was passed through sieve then coarsely powdered and stored in an airtight container for examination.

#### **Preparation of extract**

About 500mg of powdered leaves of *Gossypium herbaceum* Linn was extracted with Ethyl acetate and alcohol 90% in a Soxhlet apparatus (continuous hot percolation method) then the extract was concentrated. These extracts were subjected to qualitative analysis as well as thin layer chromatographic investigation. It indicates the presence of steroids, alkaloids, carbohydrates, tannins and proteins. This extract was insoluble in water hence it was made as suspension with water for injection using 0.05% carboxy methyl cellulose (CMC) as suspending agent.

#### **Animals**

Adult male wistar albino rats, weighing between 175 - 225 gm were acclimatized to laboratory condition for one week and given a standard diet and water.

#### **Evaluation**

All the animals received a primary dose of normal saline (25ml/kg) orally one hour prior to sample administration. The animals were divided into 6 groups having 6 animals in each group. Out of the 6 groups the 1<sup>st</sup> group served as control and was fed

with 0.05% carboxy methyl cellulose orally. The second group received Frusemide orally at the dose of 100mg/kg body weight and served as standard. The third and fourth groups were received Ethyl acetate extract at the dose of 100mg, 200mg/kg body weight respectively. The five and sixth groups were received alcohol extract at the dose of 100mg, 200mg/kg body weight respectively. After administration animals were placed in metabolic cages. Extreme care was taken to avoid the contamination of urine with faecal matter. Urine was collected after drug administration at 1<sup>st</sup> hr, 2<sup>nd</sup> hr 3<sup>rd</sup> hr 4<sup>th</sup> hr 5<sup>th</sup> hr 6<sup>th</sup> hr and 24<sup>th</sup> hr. urine volume was measured and analyzed for Na<sup>+</sup>, K<sup>+</sup> (cat ions) and Cl<sup>-</sup> (anions) in urine. The concentration estimation of Na<sup>+</sup>, K<sup>+</sup> were analyzed by flame photometer and the amount of chloride was determined titrimetrically by silver nitrite solution (2.906 g/l, dissolved in double distilled water), using one drop of 5% potassium solution as indicator.

### Results

The total urine volume of the rats administered Ethyl acetate and alcohol extracts were evaluated, particularly the rats which received alcohol extract at the dose of 200mg/kg body weight excreted nearly two folds urine as compared to the control group. The excretion of sodium, potassium and chloride ions also increased. All the results were comparable with those for frusemide and observed significant activity in Ethyl acetate and alcoholic extract (Table 1).

**Table 1: Effect of *Gossypium herbaceum* extracts on excretory parameters**

Treatment	Total volume of urine	Na <sup>+</sup>	K <sup>+</sup>	Cl <sup>-</sup>
Normal	4.27 ± 0.241	281.67	235±10.91	1025±34.22
Frusemide	20.03 ± 0.384	826 ± 9.813	573±9.71	4082±42.15
Ethyl acetate extract 100mg 200mg	9.21 ± 0.281 13.45 ± 0.125	325 ± 12.374 413.33 ± 14.29	260 ± 6.71 283 ± 9.01	2100 ± 48.15 2403 ± 38.14
Alcohol extract 100mg 200mg	14.58 ± 0.276 18.51 ± 0.113	483 512	310 ± 8.71 360 ± 10.86	2850 ± 41.26

### Discussion

The experimental results demonstrated that ethyl acetate and alcohol extract of *Gossypium herbaceum* Linn leaves acts as a diuretics in rats, with increased excretion of total volume of urine as well as cations and anions. The observed diuretic activity may be due to presence of active constituents in the extracts. The maximum diuretic activity was noted in the animals administered alcoholic extract at 200mg/kg body weight. The diuretic activities of both extracts were quite comparable with that of the standard drug frusemide. The extract caused a significant and dose dependent diuretic activity at all examined dose levels. It displayed a dose related increase in natriuretic and chloruretic activity and kaliuresis. In the basis of results, it is evident that the ethanol extract of *Gossypium herbaceum* Linn is an effective hypernatraemic, hyperchloremic and hyperkalemic diuretic, which provides the pharmacological evidence to support the folk claim for *Gossypium herbaceum* Linn leaves as an effective diuretic.

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