



## Research Article

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### DIURETIC ACTIVITY OF DIFFERENT EXTRACTS OF BARK OF *SYZYGIUM CUMINI* (LINN.) SKEELS

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#### ABSTRACT

The present study was undertaken to evaluate the diuretic activity of different extracts of bark of *Syzygium cumini* (Linn.) Skeels in Wistar albino rats. Animals were selected randomly and divided into five groups of six animals each. The test extracts were administered orally at a dose of 500 mg/kg body weight. Furosemide which was administered at a dose of 10 mg/kg body weight i.p. to the rats was used as standard drug. The diuretic activity was evaluated by determination of urine volume and urinary electrolyte concentrations of sodium, potassium and chloride ions. The findings revealed that the methanol and aqueous extract of *Syzygium cumini* possesses diuretic activity. Both the extracts have shown an increase in total urine output and increased the excretion of the electrolyte concentrations of sodium and potassium ions significantly. The study concluded that *Syzygium cumini* possess significant diuretic activity and supports the traditional claims.

**Keywords:** Albino rats, diuretic activity, *Syzygium cumini*, urine volume.

#### INTRODUCTION

Diuretics are among the most widely prescribed drugs.<sup>1</sup> Diuretics increase the rate of urine flow and sodium excretion from the body by the action on the kidney.<sup>2</sup> These diuretics adjust the volume or composition of body fluids in a variety of clinical situation, including hypertension, heart failure, renal failure, nephrotic syndrome and cirrhosis.<sup>3</sup> Naturally occurring diuretics include caffeine in coffee, tea, and cola, which inhibit Na<sup>+</sup> re-absorption and alcohol in beer, wine and mixed drinks, which inhibit secretion of Anti-diuretic hormones.<sup>4</sup> The present study was undertaken to evaluate the diuretic potential of different extracts of bark of *Syzygium cumini* (Linn.) Skeels (Family: Myrtaceae), found almost throughout India, ascending up to an altitude of 1800 m. It is a large and evergreen tree with light grey bark. Leaves are 7.5-15.0 x 3.7-6.2 cm, shining, entire, oval-oblong or lanceolate-oblong, tough and smooth. The flowers are small greenish and are arranged in broad trichotomous panicles. Fruits are oblong-obovoid or subglobose, pink and turning black, when ripe and are smooth and shining. *Syzygium cumini* is used as a traditional folk medicine in various ailments; seeds and fruits are used in treatment of diabetes. The juice of fruits is carminative, diuretic and stomachic. The bark is considered as astringent and its decoction is used as a gargle in chronic diarrhea.<sup>5</sup> Some pharmacological properties of different plant extracts of *Syzygium cumini* have been published in scientific literature and is reported for its antifungal,<sup>6</sup> anticancer, anti oxidative,<sup>7</sup> hypoglycaemic,<sup>8</sup> antiinflammatory,<sup>9</sup> sedative, anticonvulsant,<sup>10</sup> ulcer protective,<sup>11</sup> and antiviral activities.<sup>12</sup> Scientifically, there is no report on the diuretic studies of *Syzygium cumini* so far, though it is used in folk medicine.<sup>13</sup> Thus the objective of this present investigation is to explore the diuretic effects of methanol, chloroform and aqueous extracts of *Syzygium cumini*.

#### MATERIALS AND METHODS

##### Plant Collection and Authentication

The whole plants of *Syzygium cumini* were collected from local areas of Goa, India and authenticated at Regional Medical Research Centre (ICMR), Belgaum, Karnataka, India (Accession number RMRC-588). The plants were then dried at room temperature and were subjected to size reduction with a crusher to get coarse powder and then passed through sieve no. 40 to get uniform powder.

##### Plant Extraction

Around 200 g of powdered plant material were subjected to extraction with various solvents such as petroleum ether (for the purpose of de-fatting), chloroform and methanol by using successive solvent soxhlet extraction method. The aqueous extract was prepared by following maceration process. Each extract was then distilled to dryness under reduced pressure using Buchi rota evaporator to yield the respective dried extracts.

##### Drugs and Chemicals

All standard chemicals used in this study were of analytical grade. Drugs used were Furosemide tablet I.P (Lasix 40 mg, Aventis Pharma Limited, India) and the suspension of extracts (chloroform and methanol) were prepared by triturating accurately weighed quantity of the extract with 1 % Tween 80 in a glass mortar, with gradual addition of distilled water, to make up the required volume. Furosemide was diluted with distilled water.

##### Animals

Wistar albino rats of either sex (for diuretic activity) weighing between 150-200 g were obtained from P.E.S's Rajaram and Tarabai Bandekar College of Pharmacy, Ponda, Goa, India. Animals were housed into groups of 6-8 per cage at a temperature of 25 ± 1°C and relative humidity of 45-55 %. Animals had free access to food and water, however, food and water was withdrawn 18 h

before the experiment. The Institutional Animal Ethical Committee approved the protocol of this study (Resolution number: PESRTBCOP/IAEC; clear/2013-14/R-10).

### Acute toxicity studies

Literature survey found that acute toxicity study of stem bark of *Syzygium cumini* was found to be 5000 mg/kg.<sup>14</sup>

### Evaluation of diuretic activity

Animals were divided in total of five groups containing six animals in each group. All animals were deprived of food and water 18 h prior to the experiment. On the day of experiment, the dosing was scheduled as follows: Group one served as control received equivalent amount of the respective vehicle. Group two received furosemide 10 mg/kg body weight as standard and group three, four and five received *Syzygium cumini* extracts of chloroform, methanol and aqueous extracts p.o.

respectively. Normally, urine output in rats is very low (1–2 mL/rat/day). Hence, to get the measurable quantity of urine, rats of all the groups were administered with distilled water (2 mL/100 g) after 30 minutes of test drug administration. Then, the animals were placed individually in metabolic cages with netted floor and urine was collected in conical flasks placed below the polythene funnel of the metabolic cages. Extreme care was taken to avoid the contamination of urine with fecal matter.<sup>15</sup> Urine was collected up to 5 h after dosing. Room temperature was maintained up to  $25 \pm 0.5^{\circ}\text{C}$ . During this period no water or food was made available to the animals. Diuretic activity was assessed by measuring total urine volume and urine electrolyte concentration of  $\text{Na}^+$ ,  $\text{K}^+$  and  $\text{Cl}^-$  (before and after test period).<sup>16,17</sup>

### Statistical Analysis

All data are analyzed by using one way analysis of variance test (ANOVA), followed by dunnet's test.

Table 1: Parameters of diuretic activity of different extracts of *Syzygium cumini*

Parameters	Control	Standard	Chloroform extract	Methanol extract	Aqueous extract
Urine volume	1.308 $\pm$ 0.02626	3.917 $\pm$ 0.09458***	1.633 $\pm$ 0.1202	3.400 $\pm$ 0.2251***	2.250 $\pm$ 0.1839**
$\text{Na}^+$	11.30 $\pm$ 0.4539	22.30 $\pm$ 1.435***	11.77 $\pm$ 0.6463	20.94 $\pm$ 0.9140***	13.80 $\pm$ 1.060
$\text{K}^+$	59.63 $\pm$ 2.742	87.30 $\pm$ 3.336***	70.10 $\pm$ 3.058	104.1 $\pm$ 3.821***	77.13 $\pm$ 5.128**
$\text{Cl}^-$	12.03 $\pm$ 0.4745	21.87 $\pm$ 1.721***	9.510 $\pm$ 0.4152	8.553 $\pm$ 0.3750	11.67 $\pm$ 1.015

All values are mean  $\pm$  SD; \*P < 0.05, \*\*P < 0.01, \*\*\*P < 0.001 Vs control. Urine volume is expressed in mL, concentration of urine is expressed in Meq/L, N = 06 (n = Number of animals)

## RESULTS AND DISCUSSION

Preliminary phytochemical screening indicated the presence of alkaloids, flavonoids, tannins and phenolic compounds. The diuretic study was carried out as per the modified method of Lipschitz *et al.* The parameters like urine volume, concentration of electrolytes in the urine such as sodium, chloride and potassium were measured while assessing the diuretic potential of all the groups. The pharmacological study has revealed that the methanol and aqueous extract of *Syzygium cumini* possesses diuretic activity. Both the extracts have shown an increase in total urine output over a period of 5 h, with methanol extract showing the most significant urine output compared to control. Also they increased the excretion of the electrolyte concentrations of sodium and potassium ions significantly. The chloroform extract had no significant effect on urine output and electrolyte concentrations of sodium, potassium and chloride ions. Methanol extract increased sodium and potassium ions significantly, and aqueous extract moderately increased the potassium ions, however the chloride ions level was not increased in either of the treated extracts. Methanol extract showed highly significant diuretic activity comparable to aqueous extract. However the results were incomparable with the standard diuretic drug, Furosemide which showed significantly a paramount diuretic action (As shown in Table 1).

## CONCLUSION

The present study revealed that aqueous and methanol extracts showed significant diuretic activity among the tested extracts of bark of *Syzygium cumini* (Linn.) Skeels.

The findings support the traditional claims of the plant as diuretic.

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