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*Short Communication*

# Anti-inflammatory activity of *Syzygium cumini* seed

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**The *Syzygium cumini* (Myrtaceae) is a popular traditional medicinal plant in India. This study was intended to evaluate the anti-inflammatory activity of ethyl acetate and methanol extracts of *S. cumini* seed in carrageenan induced paw oedema in wistar rats at the dose level of 200 and 400 mg/kg administrated orally. Both the extracts exhibited significant anti-inflammatory activity, which supports the traditional medicinal utilization of the plant. This study established anti-inflammatory activity of the seed of *S. cumini.***

**Key words:** *Syzygium cumini*, ethyl acetate, methanol, anti-inflammatory.

## INTRODUCTION

*Syzygium cumini* or *Eugenia jambolana* (Myrtaceae), known as 'Naaval' in Tamil and Jamun, Jambul and Jambool in India and Malaya, is a medicinal plant, whose parts were pharmacologically proven to posses hypoglycemic, antibacterial, anti-HIV activity and anti-diarrhea effects (Bhuiyan et al., 1996; Kusumoto et al., 1995; Indira and Mohan, 1993; Ravi et al., 2004). Earlier, Slowing et al. (1994) and Muruganandan et al. (2001) reported the anti-inflammatory activity of leaf and barks. Hence, the present study has been made to investigate the anti-inflammatory effects of the *S. cumini* seed in wistar rats.

## EXPERIMENT

### Plant materials

The fully mature *S. cumini* seeds were collected in June-July 2006 from Kattuppalayam village in Erode District of Tamil Nadu, India from a single tree. The seed was identified and authenticated by Dr. S. Amerjothy, Head of the Department of Plant Biology and Plant Biotechnology, Presidency College, Chennai and voucher specimen (No.1586) was deposited in the Herbarium of the same department.

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### Preparation of extracts

The *S. cumini* fruits were first washed well and pulp was removed from the seeds. Seeds were washed several times with distilled water to remove the traces of pulp from the seeds. The seeds were dried at room temperature and coarsely powdered. The powder was extracted with hexane to remove lipids. It was then filtered and the filtrate was discarded. The residue was successively extracted with ethyl acetate and methanol using cold percolation method. The percentage yields were 1.81% in ethyl acetate and 10.36% in methanol. The phytochemical screening gave positive results for triterpenoids, saponins and tannins.

### Animals

Wistar rats of either sex weighing 160-180 g were purchased from King Institute, Chennai for experimental study. They were acclimated to animal house conditions fed with commercial pelleted rats chow (Hindustan Lever Ltd., Bangalore, India), and had free access to water. The experimental protocol was approved by the IAEC (Institutional Animal Ethical Committee) of CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animal).

### Preparation of the drug for the experimental study

Extracts and the standard drugs were administered in the form of suspension in water with 1% sodium carboxy methyl cellulose (SCMC) as suspending agent.

### Acute toxicity studies

Acute oral toxicity (Ecobichon, 1997) study was performed as per OECD-423 guidelines (acute toxic class method). Wistar rats (n =

**Table 1.** Anti-inflammatory evaluation of *Syzygium cumini* extracts against carrageenan induced paw oedema in rats.

| Group | Paw oedema volume (ml) | | | |
|---|---|---|---|---|
| | 60 min | 120 min | 180 min | 240 min |
| I | 0.35 ± 0.14 | 0.49 ± 0.02 | 0.65 ± 0.01 | 0.67 ± 0.01 |
| II | 0.28 ± 0.16** (20 %) | 0.39 ± 0.02* (20.4 %) | 0.39 ± 0.02*** (40 %) | 0.31 ± 0.02*** (53.7 %) |
| III | 0.25 ± 0.01** (28.6 %) | 0.38 ± 0.02* (22.4 %) | 0.38 ± 0.02*** (41.5 %) | 0.27 ± 0.03*** (59.7 %) |
| IV | 0.28 ± 0.02** (20 %) | 0.38 ± 0.03* (22.4 %) | 0.38 ± 0.03*** (41.5 %) | 0.30 ± 0.03*** (55.2 %) |
| V | 0.24 ± 0.01 *** (31.4 %) | 0.37 ± 0.01** (24.5 %) | 0.35 ± 0.02*** (46.1 %) | 0.25 ± 0.03*** (62.6 %) |
| VI | 0.22 ± 0.01*** (37.1 %) | 0.36 ± 0.01** (36.1 %) | 0.27 ± 0.02*** (58.4 %) | 0.17 ± 0.10*** (74.6 %) |

Values are mean ± SEM of 6 animals in each group.
Comparisons were made between Group I Vs II, III, IV, V and VI.
P- values: *p<0.05, **p<0.01, ***p<0.001
Percentage protection given on Parenthesis.

6) of either sex selected by random sampling technique were used for the study. The animals were kept fasting for overnight providing only water, after which the extracts were administered orally at the dose level of 5 mg/kg body weight by intragastric tube and observed for 14 days. If mortality was observed in 2-3 animals, then the dose administered was assigned as toxic dose. If mortality was observed in one animal, then the same dose was repeated again to confirm the toxic dose. If mortality was not observed, the procedure was repeated for further higher dose such as 50, 300 and 2000 mg/kg body weight.

#### Anti-inflammatory activity

The animals either sex was divided into six groups each composed of six animals.

Group I – Control animals received 1% SCMC 10 ml/kg p.o.
Group II – Animals received ethyl acetate extract at the dose of 200 mg/kg p.o.
Group III – Animals received ethyl acetate extract at the dose of 400 mg/kg p.o.
Group IV – Animals received methanolic extract at the dose of 200 mg/kg p.o.
Group V – Animals received methanolic extract at the dose of 400 mg/kg p.o.
Group VI- Standard Diclofenac sodium 5 mg/kg, p.o.

Percentage inhibition of oedema = $\left(\frac{V_c - V_t}{V_c}\right)$ x 100

Where, $V_c$ is the inflammatory increase in paw volume in control group of animals and $V_t$ is the inflammatory increase in paw volume in drug-treated animals.

Paw oedema was induced injecting 0.1 ml of 1% carrageenan in physiological saline into the subplantar tissues of the left hind paw of each rat (Winter et al., 1962). The extracts (Ethyl acetate and Methanol) were administered orally 30 min prior to carrageenan administration. The paw volume was measured at intervals of 60, 120, 180 and 240 min by the mercury displacement method using a plethysmograph. The percentage inhibition of paw volume in drug treated group was compared with the carrageenan control group (Group- I). Diclofenac sodium (5 mg / kg / p.o.) was used as reference drug.

#### Statistical analysis

Data obtained from pharmacological experiments are expressed as mean ± SEM. Difference between the control and the treatments in these experiments were tested for significance using ANOVA followed by Dunnet's *t*–test (Dixon and Jennrich, 1990).

## RESULT AND DISCUSSION

The plant extracts did not exhibit any mortality up to the dose level of 2000 mg/kg. So, the extracts safe for long term administration. The ethyl acetate and methanol extracts of *S. cumini* seed at the dose level of 200 and 400 mg/kg decreased the oedema significantly ($p < 0.001$) at 3rd and 4th h after administration of the extract. When compared to the control group. The effect was compared to the activity ($p < 0.001$) produced by standard drug diclofenac sodium at 3rd and 4th h after administration (Table 1).

In the present study, the anti-inflammatory activity of the ethyl acetate and methanol extracts of *S. cumini* seed has been established. The extracts were found to significantly inhibit the carrageenan-induced rat paw oedema, a test which has significant predictive value for anti-inflammatory agents acting by inhibiting the mediators of acute inflammation (Mossa et al., 1995). Carrageenan-induced inflammation is useful in detecting orally active anti-inflammatory agents (DiRosa et al., 1971). Oedema formation due to carrageenan in the rat paw is a biphasic event (Vinegar et al., 1969). The initial phase is attributed to the release of histamine and serotonin (Crunkhon and Meacock, 1971). The extracts of *S. cumini* seed possessed varying degree of anti-inflammatory activity when tested at various doses of 200 and 400 mg/kg. The methanol extract at the dose of 400 mg/kg showed high significant anti-inflammatory activity at 4 h, where it caused 62.6% inhibition, as compared to that of 5 mg/kg of diclofenac sodium.

## Conclusion

In conclusion, the results of the present study support to the traditional use of *S. cumini* in inflammation. *S. cumini* seed extract, possessing significant anti-inflammatory

activity. This may be due to the presence of triterpenoids, saponins and tannins which deserves further studies to establish its therapeutic value as well as its mechanism of action.

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