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Phytochemical Screening and *In vivo* Evaluation of Anti inflammatory Activity of Fruits of Lagerstroemia speciosa L

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ABSTRACT

Jarul (it is also known as Banaba) is a flowering plant that grows in warm climate like the Philippines, India and others.In India, Jarul is also used in Ayurvedic medicine for the treatment of diabetes. The Jarul leaves and flowers contain corrosolic acid, a substance being studied for its insulin like effect of lowering the glucose in the body. Jarul is also being studied as a weight-loss supplement for its ability to delay or reduce the absorption of carbohydraes. Jarul is also rich in vitamins and minerals including zinc and magnesium. Jarul is also rich in dietary fibers. The scientific name the Jarul or Banaba is Lagerstroemia speciosa L (Lythraceae). The main objective of the present work is to evaluate the Antiinflammatory activity of fruits seeds of Lagerstroemia speciosa L. Based on this, a new series of constituents had been planned to extract by Ethanol (ELN),Methanol (MLN), Acetone (ACT)and Chloroform (CLF)from the fruit seeds of Lagerstroemia speciosa L. The in-vivo Anti-inflammatory activity was carried out by carrageenan induced paw edema method in rats. The present experimental data displayed that all the extracts exhibited mild to good anti-inflammatory activity. All the extracts exhibited highest Anti-inflammatory activity at 120 min with the percentage protection of 63.18% (ELN), 48.95% (MLN), 44.95%(ACT) and 65.5%(CLF). Among these four extracts ELN and CLF displayed the highest antiinflammatory activity.

Keywords: *Lagerstroemia speciosa L*, anti-inflammatory activity, Carrageenan, Paw edema.

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INTRODUCTION

The genus Lagerstroemia was first described by Carlos Linneaus. The name Lagerstroemia recognizes Magnus von Lagerstroem, a Swedish naturalist who provided specimens from the East for Linnaeus. It is a small to medium-sized tree growing to 20 metres (66 ft) tall, with smooth, flaky bark. The leaves are deciduous, oval to elliptic, 8–15 cm (3.1–5.9 in) long and 3–7 cm (1.2–2.8 in) broad, with an acute apex. The flowers are produced in erect panicles 20–40 cm (7.9–15.7 in) long, each flower with six white to purple petals 2–3.5 cm (0.79–1.38 in) long. Folkloric uses of Banaba herbal medicine include the treatment for diarrhea, constipation, inflammation of kidneys, dysuria and other urinary dysfunctions. Banaba is a tropical flowering tree that grow up to 10 meters high. Banaba has large green oblong leaves that is about 3 inches in width and 7 inches in length. The flowers or Banaba are racemes and colored pink to lavender. Banaba bears nut-like fruits that are arranged in large clumps.It is grown in South East Asia, India and the Philippines. It is also widely cultivated as an ornamental plant in tropical and subtropical areas[1, 2]. Banabá has a long history of folkloric medical applications that include blood pressure control, urinary dysfunctions (helps ease urination), cholesterol level control, treatment of diarrhea, facilitates bowel movement, diabetes and as an analgesic[3]**.** The chemical compounds that have been isolated from the extract include corosolic acid, lager-stroemin, flosin B, and reginin A. The leaves of the Banabá and other parts are used widely in the Philippines, Taiwan, and Japan as a tea preparation. Banabá herb is one of the 69 herbal plants promoted by the Philippine Department of Health (DOH)[4] *agerstroemia speciosa* have been previously reported to have hypoglycemic activity by reducing fasting blood glucose of strptozocin induced Diabetic rats. Apart from hypoglycemic activity[5, 6, 7] .Banava leaves also possessed Antioxydant[8], Anti inflammatory[9], Antiobesity[10], Antifibrotic[11].The cytotoxic activity of fruits of *Lagerstroemia speciosa*was not investigated till now, so the main objective of the present research work is to screen the phytoconstituents and evaluate the *in vitro* cytotoxic activity of fruits (exo and endo carp) of *Lagerstroemia speciosa L.*

MATERIALS AND METHODS

Chemicals and drugs

The all chemicals used for the extraction and phytochemical screening were of LR and AR grade. The standard drug Diclofenac sodium was purchased from Local Retail Pharmacy Shop and solvents and other chemicals were used from Institutional Store and were of AR grade.

Experimental animals

White male albino rats weighing about 200-250 g were used. They were obtained from the animal house of C.L. Baid Metha College of Pharmacy, Chennai. They were kept under observation for about 7 days before the onset of the experiment to exclude any inter current infection, had free access to normal diet and water. The animals were housed in plastic well aerated cages at normal atmospheric temperature (25±5 °C) and normal 12- hour light/dark cycle under hygienic conditions.

Method of extraction (Soxhlet Extraction)

First the dried fruits and seeds are triturate to make fine powder and the powered material is placed into the thimble made of stout filter paper and the apparatus is fitted up. The flask containing suitable solvent separately like **Ethanol (ELN), Methanol (MLN), Acetone (ACT)** and Chloroform **(CLF)** is heated on a water bath or on a heating mental. As the solvent boil, its vapors rise through the side tube up into the water condenser. The condensed liquid drops on the solid in the thimble, dissolves the organic substances present in the powdered material and filters out into the space between the thimble and the glass cylinder. As the level of liquid here rises, the solution flows through the siphon back into the boiling flask. The solvent is once again vaporized, leaving behind the extracted substance in the flask. In this way a continuous stream of pure solvent drops on the solid material, extract the soluble substance and returns to the flask. At the end of the operation the solvent in the boiling flask is distilled off, leaving the organic substance behind[12]**.** Afterwards the ethanolic extract transfer in a clean and dried beaker and is concentrated by placing on a water bath and then cool, keep it in a freeze. From this concentrated extract the preliminary phytochemical screening has to be carried out.

Preliminary Phytochemical screening [13, 14, 15, 16]

Preliminary phytochemical screening of various extracts **(ELN, MLN, ACT and CLF)** of fruits of **Lagerstroemia speciosa** which was identified by Dr. N. K. Chkkraborty, Ph.D, Botanist, M.B.B. College, Agartala, Tripura, P. SPEC NO. HRB 102, had shown the presence of following bioactive compounds which were confirmed by their specific qualitative confirmatory chemical tests: Proteins and amino acids, Carbohydrates, Glycosides, Alkaloids, Terpenoids, Saponins, Phytosterols, Flavanoids, Gum and mucilage etc.

Evaluation of acute toxicity[17]

In the present study the acute oral toxicity of the various extracts **(ELN, MLN, ACT and CLF)** of fruits of **Lagerstroemia speciosa** was performed by acute toxic class method. In this method the toxicity of the extract was planned to test using step wise procedure, each step using three

Wister rats. The experimental protocol was approved by Institutional animal ethics committee (IAEC) of CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animals). IAEC Reference number: (IAEC/XXIX/10/2010). The rats were fasted prior to dosing (food but not water should be withheld) for three to four hrs. Following the period of fasting the animals were weighed and the extract was administered orally at a dose of 2000 mg/Kg b.w. Animals were observed individually after dosing at least once during the first 30 min; periodically the surveillance was carried out for the first 24 hrs with special attention given during the first 4 hrs and daily thereafter, for a total of 14 days.

Evaluation Anti inflammatory activity by Carrageen an Induced Paw Edema Method in Rats[18]

Anti-inflammatory activity ofthe various extracts **(ELN, MLN, ACT and CLF)** of fruits of **Lagerstroemia speciosa** was performed by carrageenan induced paw oedema method in rats. Diclofenac sodium (10 mg/kg i.p) was administered as standard drug for comparison. The extracts were administered at one dose level (200 mg/kg)by orally then 30 minutes prior to the administration of 0.1ml/kg body weight of carrageenan used in saline (1%w/v) into the lateral malleolus of sub-planter region of the rats left their hind paw. The paw volumes were measured using the mercury displacement technique with the help of a plethysmonograph immediately before and 30 minutes, 1, 2 and 3 hour after carrageenan injection. The percentage inhibition of paw edema was calculated by using the following formula: **Percentage protection = [(control-test)/control] × 100.**

RESULT AND DISCUSSIONS

Table 1: Evaluation of anti inflammatory activity

Extracts	30 min		60 min		120 min		180 min	
	MEAN +SEM	%	MEAN +SEM	%	MEAN +SEM	%	MEAN +SEM	%
Control	0.70 ±0.08	-	0.72±0.07	-	0.74±0.34	-	0.72±0.04	-
Diclofenac sod. (10mg/kg p.o.)	0.42 ± 0.06	40.00	0.30±0.05	58.33	0.22±0.23	70.27	0.35±0.23	51.38
ELN (200mg/kg p.o.)	0.41± 0.05	35.59	0.26±0.13	53.11	0.21±0.22	63.18	0.32±0.23.12	47.05
MLN (200mg/kg p.o.)	0.54± 0.05	22.85	0.48±0.06	33.33	0.38±0.07	48.64	0.40±0.14	44.44
ACT (200mg/kg p.o.)	0.53 ±0.08	24.28	0.50±0.04	30.55	0.41±0.03	44.95	0.42±0.34	41.66
CLF (200mg/kg p.o.)	0.40± 0.049	37.41	0.286±0.47	55.10	0.21±0.20.	65.5	0.33±0.22.9	49.20

Significant differences with respect to control was evaluated by (ANOVA), Dunnet's t test * P<0.05, **P<0.01, NS (Non significant) % (Percentage reduction of edema).

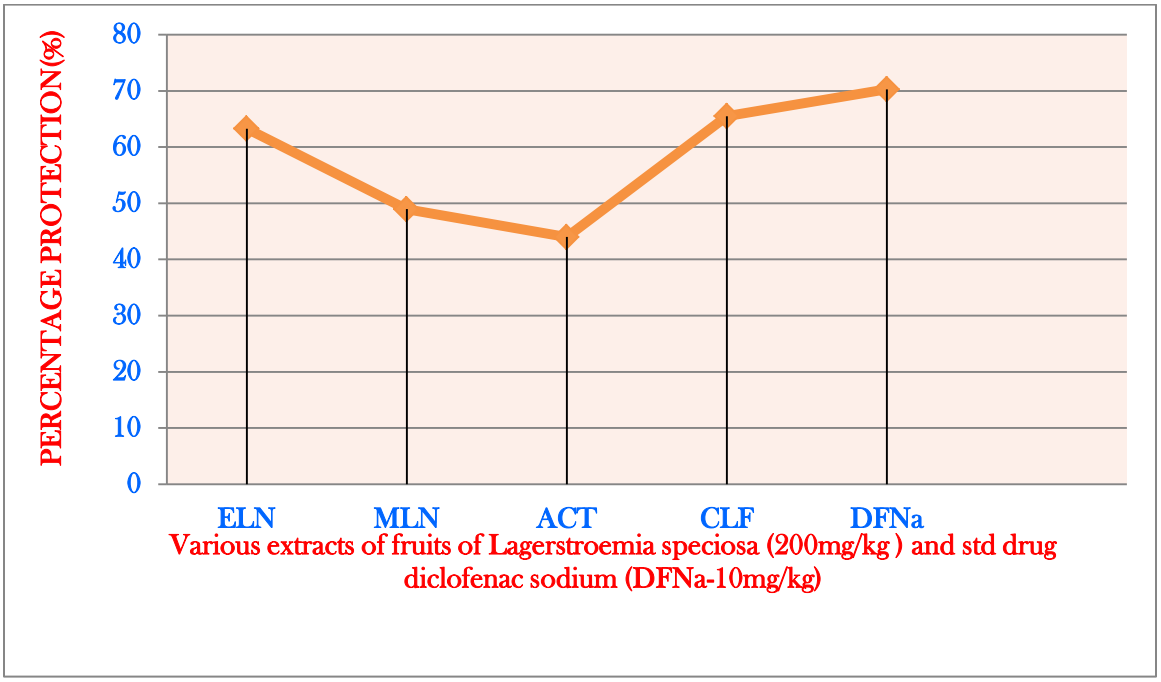

Figure 1: Graphical representation of percentage (%) protection of various extracts with reference to standard drug

A. Phytochemical screening

Preliminary phytochemical screening of various extracts like ethanol, methanol, acetone and chloroform (ELN, MLN, ACT and CLF) of fruits of Lagerstroemia speciosa had shown the presence of following bioactive compounds which were confirmed by their specific qualitative confirmatory chemical tests: Proteins and amino acids, Carbohydrates, Glycosides, Alkaloids, Terpenoids, Saponins, Phytosterols, Flavanoids, Gum and mucilage etc.

B. Pharmacological evaluation

Anti-inflammatory activity various extracts (ELN, MLN, ACT and CLF) of fruits of Lagerstroemia speciosa was evaluated by carrageenan induced paw edema method. The activity was studied at a 200 mg/kg b.w. p.o. and their responses were measured at 30, 60, 120 and 180 min. The present experimental data shown in table 1, displayed that all the extracts exhibited mild to good anti-inflammatory activity. Graded dose response was also observed. All the extracts exhibited highest activity at 120 min. When compared with standard drug diclofenac sodium (10 mg/kg i.p) it was found that the extract ELN (% of protection 63.18), MLN ((% of protection 48.95), ACT (% of protection 44.95) and CLF (% of protection 65.5). Among these four extracts ELN and CLF displayed the highest anti inflammatory activity.

CONCLUSION

In conclusion, we report here that various extracts (ELN, MLN, ACT and CLF) of fruits of Lagerstroemia speciosa had the ability to inhibit the inflammation induced by carrageenan in rat and the percentage protection was found to be the extract ELN (% of protection 63.18), MLN (% of protection 48.95), ACT (% of protection 44.95) and CLF (% of protection 65.5) .

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