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Anti inflammatory activity of aqueous extract of fruits of *garcinia pedunculata* in experimental animals.

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ABSTRACT

Garcinia pedunculata is a medicinal plant commonly known as Amlavetasa, belonging to the family Clusiaceae. The fruit of *Garcinia pedunculata* were used in the diet as a spice. It has been used as folk remedy in different ailments such as chronic catarrh, asthma, cough, bronchitis, cardiotonicand fever. The present study has been carried out to evaluate the anti inflammatory activity of aqueous extract of fruits of *Garcinea pedunculata* by carrageenan induced paw edema method. Eighteen healthy wistar albino rats were divided into three different groups of six rats each. Group I administered with normal tap water (5ml/kg) served as normal control. Group II administered with Ibuprofen 100mg/kg served as reference standard and group III administered with aqueous extract of fruits of *Garcinea pedunculata*(400mg/kg). In Acute oral toxicity study there was no mortality in any dose up to 2000mg/kg. The aqueous extract of fruits of *Garcinea pedunculata* has shown significant anti inflammatory activity by significantly decrease in the paw volume recorded at three different time interval compared with control group (**p< 0.01). It can be concluded that aqueous extract of fruits of *Garcinea pedunculata*has potent anti inflammatory activity and there is a need for further scientific investigation to explore its anti inflammatory activity.

Keywords: Garcinia pedunculata, Amlavetasa, Ibuprofen, Bronchitis, Anti- inflammatory, Carrageenan.

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INTRODUCTION

Inflammation is primarily a protective mechanism of living organisms. It causes the organisms to get rid of the basic causes as well as consequences of cell injury such as toxins and subsequent necrosis of cells. But in certain conditions the inflammation and repair process may be potentially harmful such as in rheumatoid arthritis, atherosclerosis, and lung fibrosis as well as in life threatening hypersensitive reactions to insect bites, drugs and toxins[1]. Hence there is a continuous search for novel anti inflammatory agents. At present there are wide range of anti inflammatory drugs like NSAIDS and glucocorticoids but all of these drugs associated with side effects and toxic potential in long term use[2-4]. Herbal based drugs are found to be safer in contrast to synthetic drugs. There is an arising scope for herbal based drugs. *Garcinia pedunculata* (GP) is a medicinal plant commonly known as Amlavetasa, belonging to the family Clusiaceae. The plant GP is commonly available particularly in Assam, Arunachal Pradesh and West Bengal regions. Fruits are acidic and edible. Fruits are preserved after sundried for local consumption. The old dried fruits are good for dysentery, digestion and cooling. It has been indicated for many ailments such as chronic catarrh, asthma, cough, bronchitis, fever[5,6].The phytochemical studies have shown the dried fruit rinds and pericarp contains (-) Hydroxy citric acid, benzophenones, pedenculol, garcinol and cambogin[7]. The plant has been screened for its in vitro anti oxidant activity and found to be an excellent anti oxidant property[8]. As there is no documented studies are available regarding anti inflammatory activity of the aqueous extract of fruits of Garcinia pedunculata. Therefore the present study was undertaken to evaluate the anti inflammatory activity of fruit of *Garcinia pedunculata*.

MATERIALS AND METHODS

Plant Material and extract preparation.

Fruits of Amlavetasa (*Garcinia pedunculata*) were collected from Assam region, India with the help of a botanist during March of 2012. It was authenticated by Dr. Sunil Kumar, Pharmacognosy Laboratory, SDM Centre for Research in Ayurveda and Allied Sciences, Udupi. Voucher specimen (no.13100501) has been deposited for further future reference. The powder of Amlavetasa (Garcinia pedunculata) of family Clusiaceae was prepared in the Pharmacy attached to SDM College Ayurveda, Udupi, from authenticated plant material (authentication by Pharmacognosy Lab). The powder obtained from a single batch was used throughout the experimental study. Hundred grams of the fruit powder of *Garcinia pedunculata* was soaked in 1 L of distilled water for 24 h, it was filtered and concentrated in a water bath. The concentrated

extract was used for anti inflammatory activity.

Experimental animals

Albino rats of Wistar strains of either sex between 150 to 250 g were obtained from animal house attached to department of Pharmacology, SDM Research Centre, Udupi. The experimental protocol was approved from the institutional ethical committee under the reference no. SDMCRA/IAEC-2012-13DGM01ab. The animals were fed with normal rat diet and water *ad libitum* throughout the study. They were acclimatized in the laboratory condition for two weeks prior to the experimentation. The housing provided has the following conditions: controlled lighting of 12:12h light and dark cycle, temperature of 25ºC and relative humidity of approximately 50%.

Acute oral toxicity test

The acute oral toxicity study was carried out as per OECD guidelines 425 using AOT software. The aqueous extract of fruits of *Garcinia pedunculata* (AFGP) was made suspension in 0.5% gum acacia and dosed in the following order 175, 550, and 2000mg/kg body weight. After the dosing the animals were observed for 14 days for mortality. The dose at which the animal dies, that particular dose is repeated two times to determine its toxic potential. If mortality was not observed at 2000mg/kg, dosing was stopped and LD 50 was determined by using AOT software.

Anti -inflammatory activity

Carrageenan induced hind paw edema

Albino rats of either sex weighing 150-200g were divided into three groups of six rats each. The control group received 0.5ml/kg normal tap water in 0.5% gum acacia, reference standard group administered with ibuprofen 100mg/kg as a suspension with 0.5% gum acacia and the test drug AFGP administered at dose of 400mg/kg as a suspension with 0.5% gum acacia. Acute inflammation was produced by injecting 0.1 ml of 1% carrageenan solution into sub plantar surface of rat's hind paw[9]. The group specific drugs were administered 1h before the Carrageenan injection. The paw volume up to the tibio- tarsal articulation was measured using a Plethysmometer (PLM-01 PLUS Orchid Scientifics) at basal, 1h, 3h, and 6h after Carrageenan injection. The anti-inflammatory activities were expressed as percentage decrease in paw oedema using the following formula[10].

Percentage change in paw oedema = Vc – Vt/ **Vc** X 100

Vc- Paw volume of control group, Vt- Paw volume of test group

RESULTS AND DISCUSSION

In Acute oral toxicity study there is no mortality in any dose up to 2000mg/kg of aqueous extract of fruits of the plant *Garcinia pedunculata* and hence 1/5th of dose was selected for the present anti inflammatory study.

The anti inflammatory activity was compared between the aqueous extract of fruits of GP along with control group. From the result it can be observed that the AFGP has shown significant anti inflammatory activity by significantly decrease in the paw volume recorded at 1st, 3rd and 6th hour compared with control group. The result obtained in anti inflammatory assay of AFGP and percentage inhibitions are shown in Table 1& 2.

Table 1:Effect of *Antidesma menasu* in Carrageenan induced paw oedema test

Group	Dose	Percentage change in Carrageenan induced paw oedema (ml)			
		Basal	1h	3h	6h
Normal control	10 ml/kg	0.88±0.034	1.23 ±0.06	1.16±0.03	1.72±0.09
Ibuprofen	100 mg/kg	0.90±0.03	1.16±0.06	1.28±0.08**	1.19±0.05**
AFGP	400 mg/kg	0.93±0.027	0.98±0.03*	1.01±0.04**	0.98±0.04**

Each value represented in Mean± SEM, *p<0.05, **p<0.01 in comparison with control group (one way ANOVA). AFGP – Aqueous extract of fruits of *Garcinia pedunculata*.

Table 2:Effect of *Garcinia pedunculata* on percentage inhibition of carrageenan induced paw edema.

Group	Dose	Percentage inhibition of edema at different time intervals		
		1h	3h	6h
Normal control	5ml/kg	-	-	-
Ibuprofen	100 mg/kg	5.69↓	10.34↓	30.81 ↓
AGP	400 mg/kg	20.32↓	12.93↓	43.02↓

Formula used to calculate percentage change in carrageenan induced paw oedema test is as follows **% change in paw volume = Vc – Vt/ Vc X 100**

(Vc – Paw volume of control group, Vt – Paw volume of test group)

In the present study AFGP was evaluated for its anti inflammatory activity by carrageenan induced hind paw edema method. Acute inflammation conveniently described as vascular and cellular events, alteration in the microvasculature is the earliest response to tissue injury. These alterations include hemodynamic changes such as transient vasoconstriction, persistent progressive vasodilatation, followed by local hydrostatic pressure, stasis, leukocyte migration, and vascular changes in which accumulation of oedema fluid. In cellular events, phagocytosis, that is engulfment solid particulate materials by cells, causes the inflammation. The carrageenan induced paw edema is the standard experimental model used for acute inflammation.

Carrageenan is the inflammatory agent of choice for testing anti inflammatory drugs and the experimental model exhibits a high degree of reproducibility. The inflammation produced by carrageenan is believed to be biphasic. The early phase is mainly mediated by histamine, serotonin and kinins in the damaged tissues. The later phase is sustained by prostaglandin release and mediated by bradykinin, leukotrienes, polymorphonuclear cells and prostaglandins. The activity of inflammatory agents attains peak level at 3rd hour after carrageenan injection[11].

The anti-inflammatory activity was expressed as mean increase in paw volume ± SEM interns of ml and percentage inhibition in paw volume at different time interval.

The result of the present study revealed that the AFGP has potent anti inflammatory activity by inhibitory effect on mean increase in paw volume induced by carrageenan injection in the sub plantar region of the rats paw. AFGP administered at a dose of 400mg/ kg shown significant (*$p<0.05$ and **$p<0.01$) anti-inflammatory activity by decreasing mean paw volume at first, third and sixth hour of reading compared with that of control group.

It has been observed that the AFGP showed biphasic inhibitory response to the carrageenan induced inflammation. It indicates the AFGP has inhibitory effect on release of histamine, serotonin and kinins from the damaged tissue. It has been reported that the second phase of edema is sensitive to drugs like phenyl butazone, ibuprofen, indomethacine and glucocorticoids. Ibuprofen is a cyclo oxygenase inhibitor, the test drug AFGP has activity which is comparable with that of ibuprofen and can be said to inhibit the cyclo oxygenase enzyme. But there exist one more mechanism through the lipoxygenase inhibition also possesses significant anti inflammation activity against carrageenan induced paw edema, so inhibition of carrageenan induced paw edema by AFGP could also be due to its inhibitory activity on the lipoxygenase enzyme. The preliminary phytochemical analysis revealed the presence of Flavonoids, saponins, glycosides, steroids, alkaloids and phenols. It is also reported that the fruit of *Garcinia pedunculata* has good anti oxidant property and reported in the earlier studies. Thus these phytochemical may attribute the anti inflammatory activity of *Garcinia pedunculata*.

CONCLUSION

In the present study the anti inflammatory activity of AGP can be attributed to the above phytochemical constituents. From the present preliminary investigation it can be concluded that the fruits of *Garcinia pedenculata* possessed marked anti inflammatory activity against carrageenan induced paw edema. Further scientific investigation is required to ascertain the mechanism of action and chemical constituent responsible for its anti inflammatory action.

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