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Investigation of Anti-inflammatory Activity of Flowers of *Cassia fistula* Linn

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ABSTRACT

Cassia fistula Linn is known as golden shower has therapeutic in healthcare since ancient time research finding over the last two decades have confirmed the therapeutics consequence of *cassia fistula* in health management via modulation biological activities due to the rich source of antioxidants. Several finding based on the animals model have conformed the pharmacology safety and efficacy have opened a new window for human health management. This review reveals additional information about *cassia fistula* in the health management via in vitro and in vivo study which will be beneficial towards disease control.

Keywords: *Cassia fistula*; Anti-inflammatory activity; Flowers; Therapeutics

INTRODUCTION

Cassia fistula linn known as the golden rain tree, canafistula and other names is a flowering plant in family casealpiniaceae. *Cassia fistula* is found to possess following medicinal uses: Antipyretic, analgesic, antifungal, antiviral activity. The study of Indian medicinal plant revealed that *Cassia fistula* Linn was traditionally used for its anti-inflammatory effect [1].

Vascular tissues and nonspecific reactions used by both innate and acquired immune responses against injury, damaged cells, infection and irritants are components of the complex biological process known as inflammation. A variety of metabolic processes in many cell types are involved in inflammation, which is broadly categorized as either acute or chronic. The initial reaction, known as acute inflammation, is defined by increased blood circulation of plasma and innate immune cells, such as neutrophils and macrophages, into the injured tissues.

Chronic inflammation is characterized by a continuous fluctuation in the kind of cells at the site of the inflammatory response and is linked to both concurrent injury and healing of the wounded tissue. It is well recognized that medicinal plants are important sources of potent anti-inflammatory compounds. The World Health Organization (WHO) estimates that over 75% of people worldwide receive their medical care through conventional means. It is evident that many plants have been believed to have wound-healing properties and have been utilized in traditional medicine to treat a variety of inflammatory illnesses.

Pudding pipe or golden shower is other names for *Cassia fistula* L, a semi-wild Indian laburnum and a characteristic vanishing species. Numerous regions are home to *C. fistula*, including Brazil, East Africa, Mexico, South Africa, the West Indies and Asia. The shrub produces eye catching clusters of yellow blossoms. While the flowers, fruits and seeds are used by some ethnic peoples to treat fever, skin conditions, leprosy and stomach ache, the entire plant is used to treat diarrhea.

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The seeds help with skin conditions, swelling throats, nausea and jaundice. Studies on *C. fistula* have demonstrated its anti-inflammatory properties, hepato protective properties, wound healing properties and hypoglycemic properties in its leaves [2].

Collection and preparation

The whole plant *Cassia fistula* linn were collected from sitaram nursery Indore M.P. And was identified by Dr. S. k. Mahajan department of botany PG college Khargone India. The coarsely powdered flowers (250 gm) of powdered of *Cassia fistula* were packed in soxhlet apparatus and maceration separately and extracted with solvent ethanol and aqueous. The extracts were filtered while hot and the solvents were removed by distillation and the last traces of solvent being removed under reduced pressure. The ethanolic and aqueous extracts were stored in refrigerator for further experimental work.

Acute toxicity studies: All the animals survived without any symptom or toxicity during the observations up to 24 hrs. Based on the above observation, LD₅₀ of the compound was confirmed to be greater than 200mg/kg for the test compound.

LITERATURE REVIEW

Animal care and handling

This was done as per the guidelines set by the Indian National Science Academy (INSA) New Delhi India. Albino mice (25 g-30 g) of either sex were used in the entire study. They were housed in standard polypropylene cages and kept under controlled room temperature (24°C ± 2°C; relative humidity 60%-70%) in a 12 h light dark cycle. The animals were fed with standard laboratory diet and water *ad libitum*. Food was withdrawing 12 h before and during the experimental hours. The experimental protocol was approved by Institutional Animal Ethics Committee (IAEC).

The hind paw oedema induced by sub plantar injection of, control group treated (I) 0.1 ml Carrageenan (1% w/v), (II) ibuprofen (standard) 40 mg/kg, (III), (IV) 150-200 mg/kg of water extract, (V), (VI) 150-200 mg/kg ethanolic extract, was evaluated according to the method described by, 0.1ml of 1% w/v carrageenan was injected into the sub plantar tissue of left hind paw of each rat. Swelling of carrageenan injected foot was measured at 0, 1, 2, 3 h using plethysmometer (UGO Basile, Italy). Animals were treated with test extract 1 hour before the carrageenan injection. Measurement was carried out immediately before and 3 hrs following carrageenan injection. Percent inhibition of test drugs was calculated in comparison with vehicle control (100%) [3].

DISCUSSION

Statistical analysis

Statistical analysis value are expressed in mean ± SEM. Result were analyzed by one way analysis of (ANOVA) followed by Dunnett's test for multiple comparisons" instead of "for multiple comparisons verses control group was done by Dunnett's test P value.

Carrageenan induced paw in mice: The results obtained from the carrageenan induced inflammation model, indicated that ethanol and aqueous extract showed significant (p<0.05) anti-inflammatory activity as compared to saline. The carrageenan induced edema inhibition after the treatment with the phlogistic agent. The % decrease in paw volume at 3 h from 52.30 (h) ibuprofen to 50.29 and 66.45 (h) in ethanol extract at a dose of 150 and 200 mg/kg and 52.32 (h) and 68.49 (h) in aqueous extract at a dose of 150 and 200 mg/kg. Results obtained are presented in Table 1 and Figure 1).

Table 1: Results obtained from the carrageenan induced inflammation model. Note: N=6, treatment, mg/kg, data were analyzed using ANOVA and expressed as Mean ± SEM followed by Dunnett's and differences between means were regarded significant at * (P<0.05), **P<0.01 saline, EE- Ethanolic Extract.

Treatment (mg/kg)	Mean increase in paw volume (ml)				% decrease in paw volume at 3 h
	0 h	1 h	2 h	3 h	
Control	0.92 ± 0.01	1.50 ± 0.007	1.86 ± 0.004	2.48 ± 0.007	-
Ibuprofen	0.89 ± 0.008	1.08 ± 0.01 *	1.28 ± 0.002**	1.62 ± 0.001 *	52.3
EE (150 mg/kg)	0.94 ± 0.037	1.20 ± 0.035**	1.49 ± 0.32 **	1.70 ± 0.049**	50.29
EE (200 mg/kg)	0.92 ± 0.046	1.18 ± 0.061 **	1.30 ± 0.037**	1.44 ± 0.035**	66.45
AE (150 mg/kg)	0.93 ± 0.035	1.26 ± 0.037**	1.48 ± 0.30**	1.69 ± 0.047**	52.32
AE (200 mg/kg)	0.91 ± 0.045	1.20 ± 0.063**	1.28 ± 0.035**	1.44 ± 0.035**	68.49

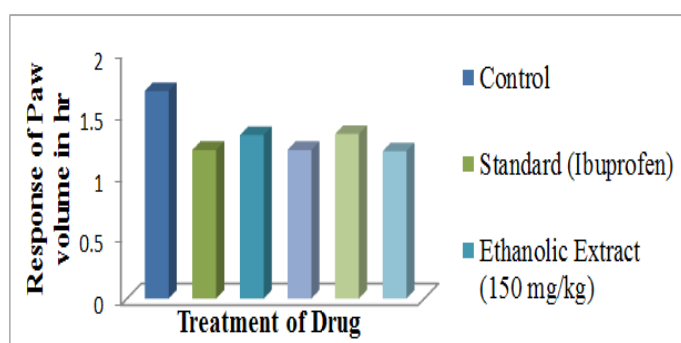


Figure 1: Response of paw volume in hour.

The present investigations of *Cassia fistula* flowers extracts were studied against experimentally anti-inflammatory activity studies. In preliminary phytochemical screening ethanolic and aqueous extract showed positive results. Ethanolic extract showed presence of carbohydrates, alkaloids, glycosides, phenol and tannins, proteins and steroid. Aqueous extract showed presence of carbohydrates, alkaloids, saponins, glycosides, phenol and tannins. Ethanolic and aqueous *Cassia fistula* extract was studied for acute oral toxicity as per revised OECD guidelines number 425. *Cassia fistula* was devoid of any toxicity up 2000 mg/kg in albino mice and rat by oral route. Hence for further studies doses of mice in the 150 to 200 mg/kg and rat in the 200 to 250 mg/kg of *Cassia fistula* was used [4].

In Carrageenan induced inflammation significant mean increased in paw volume was also observed in animals treated with standard (Ibuprofen) drug. The numbers of entries were significantly increased in animals treated with ethanol and aqueous extract and standard drug Saline when compared to control animal [5-7]

CONCLUSION

In conclusion the ethanolic extracts and aqueous extracts flowers of *Cassia fistula* anti-inflammatory activity at both the dose level which is comparable with the standard. The ethanol extract of *Cassia fistula* (200 mg/kg), markedly increased the percentage of average mean increased in paw volume and weight in cotton pellet by the animals. The anti-inflammatory effect of both the doses (150-200 mg/kg in mice and 200-250 mg/kg in rat) showed significant activity and being that (200 mg/kg) showed higher activity.

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