ANTI-INFLAMMATORY ACTIVITY OF THE BARKS OF SARACA INDICA LINN

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Summary

Saraca indica Linn (Family: Leguminosae) commonly known as ashoka / asoka, is one of the foremost plants utilized from antiquity till to date. It is highly regarded as a universal panacea in the ayurvedic medicine. It is one of the universal plant having medicinal activities. The analgesic and anti inflammatory activity of various doses of the hydro-alcoholic extract of Saraca indica Linn was studied on rats. The doses selected were 100mg/kg, 200mg/kg and 400mg/kg. The anti inflammatory study was carried out by Carrageenan induced paw edema model and analgesic activity by Tail flick and Tail immersion methods. From the study we can conclude that the extract is having a significant analgesic and anti inflammatory activity

Key Words: Anti inflammatory, Analgesic, Carrageenan, Paw edema, tail flick, Tail immersion

Introduction

Inflammation is a protective tissue response to injury or destruction of tissues, which serves to destroy, dilute, or wall off both the injurious agent and the injured tissues. The classical signs of acute inflammation are pain (dolor), heat (calor), redness (rubor), swelling (tumor), and loss of function (functio laesa). Inflammation is caused by various agents like Burns, Chemical irritants, Toxins, Ionizing radiation, Frost bite, Infection by pathogens, Physical injury, blunt or penetrating Immune reactions due to hypersensitivity, Foreign bodies including splinters, dirt and debris[1, 2] . Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Both inflammation and pain are the usual symptoms associated with many disorders.

Herbal medicines represent probably the first and certainly the oldest system of human healthcare. Since olden days, plants are used to treat many ailments. A large number of medicinal plants are used for the treatment of various kinds of inflammations. Synthetic anti inflammatory agents in current use for the treatment of inflammation and pain, produce a large number of serious side effects. WHO recommends the use of medicinal plants for the treatment of inflammation. So the search for new analgesic-anti inflammatory drugs and their mechanism of action continues.[3]

Saraca indica Linn (Ashoka) is one of the most legendary and a sacred tree of India. This versatile plant is the source of various types of compounds. In the present scenario many plant are used to treat many diseases. But *Ashoka* is an ancient and reliable source of medicine [4]. The various parts of the plant Saraca indica are used both internally and externally in various systems of medicine. The seed, bark and flowers of Ashoka are mainly used for in menorrhagia, astringent, Diabetes, biliousness, dyspepsia, ulcers and can also be used as uterine stimulant, estrogenic effects, abortifacient [5, 6]. Many numbers of work had been done on this plant like uterine stimulant [10], anti-ulcer[7], anti depressant [8], antibacterial [9], antioxidant [10] and larvicidal activity [11] etc showing its pharmacological importance.

Materials and methods

Animals

Female Wister rats weighing 150-200 g were used. They were housed in standard environmental conditions (as per Institutional Animal Ethical Committee norms) and fed with standard pellet diet and water *ad libitum.*

Plant material

The plant materials of *Saraca indica,* used for the pharmacological investigation of the activity, were collected from the local areas of Kerala in the month of June. The collected barks were cleaned from dust and other materials, and then they were dried under the shade. After confirming the dryness, the barks were chopped and pulverized in an electric grinder. The powdered barks were subjected to extraction separately.

About 200g the shade dried bark powder of *Saraca indica Linn* was subjected to solvent extraction. The powder material was refluxed with ethanol (90%) and distilled water in a Soxhlet extractor for 18 hrs in batches of 25g each cycle. The extracts obtained by the above techniques were concentrated by evaporation. The yield obtained after evaporation was 10.2g. The dried bark extract of Saraca indica was then stored in a desiccator for further use.

Experimental Design:

1. Carrageenan induced paw edema in rats [12, 13]**: -** Rats of wistar strain weighing 150-180g were used for the study. After overnight fasting rats were divided into five groups (each group containing six animals). First group was kept as vehicle control that received a suspension of 1 ml of carboxy methyl cellulose, p.o. The experimental groups 3, 4 and 5 were received the hydro-alcoholic leaf extract of different doses (100 mg/kg, 200 mg/kg, and 400 mg/kg) respectively and group-2 received the standard in an identical manner.

Gp-1 – Receives vehicle [Control 2% CMC]
Gp-2 – Receives Diclofenac sodium 10mg/kg [standard]
Gp-3 – Extract 100mg/kg
Gp-4 – Extract 200mg/kg
Gp-5 – Extract 400mg/kg

After 30 minutes of above treatment all the animals were injected with 0.05ml of 1%w/v carrageenan in saline through sub-plantar route. The degree of paw edema of all the groups was measured at 0, 60, 120, 180 minutes using plethysmograph. The results are expressed in terms of mean increase in paw volumes at 60min, 120min and 180min.The anti-inflammatory activity is expressed in terms of % inhibition of paw edema at 180min.

2. ***Tail Flick Method***[13,14]**:**

The analgesic activity was tested using analgesiometer. Overnight fasted female wistar rats (150-180g) were used for the study. The rats were divided into four groups with six rats in each group.

Gp.1- Standard (pentazocin 30mg/kg)
Gp.2- Extract 100mg/kg
Gp.3- Extract 200mg/kg
Gp.4 –Extract 400mg/kg

The basal reaction time was noted before treatment and 30min, 60min and 90min after the standard/extract administration according to their groups. The basal reaction time was taken by keeping the tip of the tail of rat in the radiant heat of analgesiometer at 55˚c±0.5˚c and the time taken for the tail withdrawal was taken as the response. The results were calculated from the difference between before treatment and after treatment. The results of extract treated groups were compared with the standard treated group.

3. *Tail Immersion Method*[15]:

Overnight fasted female wistar rats (150-180g) were used for the study. The rats were divided into four groups with six rats in each group as in tail flick method. The basal reaction time was noted before treatment and 30min, 60min and 90min after the standard/extract administration according to their groups. The basal reaction time was taken by keeping the tip of the tail of rat in the hot water maintained at 55˚c±0.5˚c and the time taken for the tail withdrawal was taken as the response. The results were calculated from the difference between before treatment and after treatment. The results of extract treated groups were compared with the standard treated group.

The results are expressed as mean ± SEM. The differences are compared using one-way ANOVA. $P<0.05$ were considered significant.

Results and Discussion:

1.Effect of the leaf extract of Saraca *indica Linn* on carrageenan induced paw edema

Sl.No	Treatment	Dose (mg/kg)	Mean increase in paw volume (ml±SEM)			% inhibition of Edema at the end of 3hr
			1hr	2hr	3hr	
1.	Vehicle	-	0.68± 0.01	0.70± 0.02	0.73± 0.04	-
2.	Diclofenac sodium	5	0.23±0.01 [a]	0.20± 0.01 [a]	0.17±0.02 [a]	76.71
3.	Plant extract	100	0.66±0.01	0.64±0.01	0.61±0.01	13.69
		200	0.43±0.02 [a]	0.27±0.03 [a]	0.25±0.02 [a]	64.75
		400	0.36±0.03 [a]	0.28±0.02 [a]	0.21±0.01 [a]	69.12

Table.1: Effect of hydro alcoholic leaf extract of Saraca indica Linn on carrageenan induced paw edema

The values are expressed as mean ± SEM (n =5), a- significant $P<0.05$ compared to control.

The prior administration of hydro-alcoholic extract of Saraca indica Linn inhibited carrageenan induced paw edema in rats. By comparing the results of control and the extract treated groups, there is much decline in the paw edema at 1st hr, 2nd hr& 3rd hr. The groups treated with 200mg/kg and 400mg/kg had shown a significant decline in paw edema. The results of extract 400mg/kg are comparable with that of the standard.

2. Analgesic effect of leaf extract of *Saraca indica Linn* by Tail flick method

		Reaction Time(min)				
Treatment	**Dose mg/kg**	**0**	**30**	**60**	**90**	**120**
Control	-	2.33+0.11	2.38+ 0.08	2.32+ 0.09	2.34+ 0.11	2.32+ 0.11
Standard	10	2.65+ 0.21	4.96+ 0.31*	7.54+ 0.55*	8.25+ 0.21*	7.09+ 0.71*
Extract	100	2.64+ 0.14	3.42+ 0.16*	4.57+ 0.12*	4.92+ 0.25*	4.07+ 0.08*
	200	2.43+ 0.17	3.30+ 0.15*	4.16+ 0.17*	4.98+ 0.18*	4.72+ 0.11*
	400	2.54+ 0.16	4.74+ 0.14*	5.29+ 0.27*	5.98+ 0.19*	4.97+ 0.29*

Table.2: Analgesic effect of hydro-alcoholic leaf extract of Saraca indica Linn by tail flick method
All the values are expressed as mean + S.E.M. (n=5); *- P< 0.01 significant compared to control

3. Analgesic effect of leaf extract of *Saraca indica Linn* by Tail immersion method

		Reaction Time(min)				
Treatment	**Dose mg/kg**	**0**	**30**	**60**	**90**	**120**
Control	-	3.21+0.11	3.28+ 0.02	3.12+ 0.09	3.34+ 0.11	3.32+ 0.11
Standard	10	3.65+ 0.21	5.96+ 0.31*	7.54+ 0.55*	8.25+ 0.21*	7.09+ 0.71*
Extract	100	3.64+ 0.14	4.42+ 0.16*	5.57+ 0.12*	5.92+ 0.25*	5.07+ 0.08*
	200	3.43+ 0.17	4.30+ 0.15*	5.16+ 0.17*	5.98+ 0.18*	5.72+ 0.11*
	400	3.54+ 0.16	5.74+ 0.14*	6.29+ 0.27*	6.98+ 0.19*	5.97+ 0.29*

Table.3: Analgesic effect of hydro-alcoholic leaf extract of Saraca indica Linn by tail immersion method
All the values are expressed as mean + S.E.M. (n=5); *- P< 0.01 significant compared to control

The results of analgesic effect by tail flick and tail immersion methods have shown that the bark extract was having significant effect. The extracts at doses 200mg/kg and 400mg/kg have shown effects at 60min and 90min. The analgesic effect shown by the extract at 400mg/kg is comparable with the standard, pentazocin.

The hydro alcoholic bark extract of *Saraca indica Linn* produced statistically significant analgesic effects by Tail flick and Tail immersion methods. The extract had also shown a significant anti inflammatory activity by Carrageenan induced paw edema

method. The study indicates that the hydro alcoholic bark extract of *Saraca indica Linn* has a potential analgesic and anti inflammatory effects

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