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Analgesic Activity of Ethanolic Extract of *Sterculia Foetida* Linn. Flowers

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Abstract

Medicinal plants have been used both in the prevention and cure of various diseases since ancient times. *Sterculia foetida* Linn. is a medicinal plant used traditionally as herbal remedy for alleviating pain and for treating various skin diseases and disorders. The seeds of *Sterculia foetida* Linn have been reported to have analgesic and anti-inflammatory activity. The present study intended to evaluate analgesic activity of ethanolic extract of *Sterculia foetida* Linn. flowers. The qualitative phytochemical analysis of flower extracts in ethyl acetate and ethanol revealed the presence of flavonoids, saponins and carbohydrates. Analgesic activity of *Sterculia foetida* Linn flowers was evaluated using the Hot plate method at three dose levels (100, 300 and 500 mg/kg). Analgesic activity was found to be significant at 500mg/kg when compared with control. Considering the findings of this study *Sterculia foetida* Linn. flowers can be considered as a potential source of pain relieving herbal drugs.

Keywords

Analgesic activity, Sterculia foetida Linn., Hot plate method

Greentree Group

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INTRODUCTION

Pain is a sensorial modality and primarily protective in nature, but often causes discomfort. It is the most important symptoms that brings patient to physician. Analgesics relieve pain as a symptom without affecting its cause. Currently available analgesic drugs are not useful in all cases due to their adverse effects. In this respect new compounds with improved pain management and fewer side effects are being sought with urgency[1].

Sterculia foetida Linn. is a tropical plant belonging to Sterculiaceae family. In India it is known as Jangli badam in Hindi, Goldaru in Marathi and Poon tree or Wild almond in English[2]. In Philippines decoction of its bark used for dropsy and rheumatism; as aperient, diaphoretic and diuretic[2]. Decoction of leaves used as wash for skin eruptions. Fruit contains oily kernels which are edible and laxative when raw[3]. Decoction of fruit is mucilaginous and astringent. Oil from seeds given internally for itching and skin diseases, also applied externally as a paste[4]. The seed extract of *Sterculia foetida* Linn. is reported to have analgesic and anti-inflammatory activity[1]. Thus it was interesting to evaluate the pharmacological activity of the plant species flowers. The present study was designed to examine the analgesic activity of the ethanolic extract of the flowers of *Sterculia foetida* Linn.

MATERIALS AND METHODS

Plant collection and identification

The flowers of *Sterculia foetida* Linn. were collected from the trees growing in Matunga, Mumbai, India and identified at the Botanical Survey of India, Pune. The herbarium of plant specimen has been deposited at B. S. I., Pune. Reference no. BSI / WC / Tech 2009/121.

Preparation of Extract

The flowers of *Sterculia foetida* Linn. were collected, dried in oven at 35^{o}C for a week. Dried flowers were finely powdered. The powdered material was extracted with ethanol using a Soxhlet apparatus at 70^{o} C. The solvent was completely removed, filtered and evaporated to dryness on water bath at 70^{o} C. The obtained extract used for further investigation was semisolid and sticky in nature[5].

Phytochemical Screening

The freshly prepared ethyl acetate and ethanolic extracts were subjected to preliminary phytochemical screening for evaluation of major phytochemical constituents such as alkaloids, steroids,

tannins, cardiac glycosides, flavonoids, saponins, triterpenes and carbohydrates[5].

Analgesic Screening [6,7]

Analgesic activity of *Sterculia foetida* Linn flowers was evaluated using the Hot plate method.

Animals

Swiss albino mice of either sex, 3-4 weeks of age, weighing between 20-30g, were procured from Bombay Veterinary College, Parel, Mumbai, India. Animals were maintained under standard environmental conditions (temperature: 25±2^{o}C, relative humidity: 70±5% and 12h light and 12h dark cycle) and had free access to feed and water ad libitum. The animals were acclimatized to laboratory condition for one week prior to experiments. All protocols for animal experiment were approved by the Institutional Animal Ethical Committee, Mumbai (IAEC) Proposal No. MVC/IAEC10/2014.

The animals were divided into five groups with six mice in each group as follows:

Group I - Control (2% Tween 80 in water) 10mg/kg.

Group II - Aspirin 25mg/kg.

Group III - Ethanolic extract of *Sterculia foetida* Linn. flowers 100mg/kg.

Group IV -Ethanolic extract of *Sterculia foetida* Linn. flowers 300mg/kg.

Group V -Ethanolic extract of *Sterculia foetida* Linn. flowers 500mg/kg.

Route of administration was oral via guavage.

The animals were placed on Eddy's hot plate kept at temperature of 55±2^{o}C. Reaction time was recorded in seconds when animals licked their fore or hind paws or jumped after oral administration of the samples. The time intervals studied were 0, 30, 60 and 90 min respectively.

Statistical analysis

Data were presented as mean ± Standard Arithmetic Mean (SEM). Statistical analysis of all the results was carried out using one-way ANOVA followed by LSD test and all the results obtained in the study were compared with the vehicle control group. *P* values <0.05 were considered statistically significant.

RESULTS AND DISCUSSION

Phytochemical screening: Phytochemical analysis of the *Sterculia foetida* Linn flower extracts in ethyl acetate and ethanol revealed the presence of flavonoids, saponins and carbohydrates. Though these phytochemicals were not observed in the

petroleum ether extract of the flowers (Table 1).

Table 1 Preliminary phytochemical screening of *Sterculia foetida* Linn. flowers

Class of Compound	***Sterculia foetida* Linn. flower extract in**	
	Ethyl acetate	Ethanol
Tannins	-	-
Steroids	-	-
Alkaloids	-	-
Cardiac Glycosides	-	-
Flavonoids	+	+
Saponins	+	+
Triterpenes	-	-
Carbohydrates	+	+

Key: (-) = Absent, (+) = Present

Analgesic screening:

Hot plate method: Results of hot plate test is shown in Table 2. The dose of 500 mg/kg of the extract produced increase in latency time. The results were found to be statistically significant ($p<0.05$) when compared with vehicle.

While evaluating the analgesic activity of ethanolic extract of flowers of *Sterculia foetida* by hot plate method, it was observed that Aspirin showed significant analgesic effect at 0, 30, 60 and 90 minutes. Normal 2% Tween 80 solution (Group-1) did not have any significant change in reaction time. The different doses of ethanolic extract of flowers of *Sterculia foetida* showed change in reaction time at 30, 60 and 90 minutes after oral administration of sample. The ethanolic extract 500mg/kg showed significant activity at 30, 60 and 90 minutes as compared to control group. The ethanolic extract 100mg/kg and 200mg/kg were found to have no significant activity.

Table 2 Analgesic activity of *Sterculia foetida* Linn. flowers

Group	**Dose (mg/kg)**	**Mean latency time (s) ± S. E. M.**			
		0 min	**30min**	**60min**	**90min**
I	Vehicle (10ml/kg)	24.102±0.544	25.522±0.740	27.161±0.574	28.401±0.416
II	Aspirin (25mg/kg)	24.253±0.400	28.791±0.370	29.398±0.484	31.496±0.719
III	Ethanol extract (100mg/kg)	24.781±0.587	27.353±0.371	27.865±0.414	29.343±0.377
IV	Ethanol extract (300mg/kg)	24.046±1.315	26.500±0.288	27.942±0.352	29.365±0.543
V	Ethanol extract (500mg/kg)	24.183±0.504*	26.522±0.508 *	29.298±0.260*	30.165±1.075*

All values are expressed in Mean ± SEM., n=6
*P<0.05, LSD test as compared to control

CONCLUSION

In the present research study, phytochemical and pharmacological investigation of *Sterculia foetida* Linn. flowers were carried out. Phytoconstituents like saponins, flavonoids and carbohydrates were found to be present which may contribute to the medicinal properties of the plant. These may be further isolated and characterized for future work. The ethanolic extract of the studied plant flowers showed significant analgesic activity at 500mg/kg as compared to standard analgesic. The analgesic potential of *Sterculia foetida* Linn. flowers has been exhibited and statistically evaluated by our research work which has not been reported earlier.

The encouraging results obtained suggest that the selected plant *Sterculia foetida* Linn. is endowed with potential analgesic activity. Thus scientifically justifying its use in the folklore remedies as analgesic agent since ancient times. Though understanding the mechanism of its analgesic action requires further study and confirmation. Considering the pain relieving potential of *Sterculia foetida* Linn. it can be developed as a herbal analgesic agent or as a key component of a similar drug formulation.

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