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Evaluation of Analgesic Activity of Pongamia Pinnata Linn in Wistar Albino Rats

Salma Begum*, Airaj Mahajabeen, Rubina Kauser, Farhana Shaheen, Syed Sajid Ali

MRM College of Pharmacy, Chintapalliguda, Ibrahimpatnam, R.R District-501510

A B S T R A C T

The dry leaves of Pongamia pinnata Linn. is used in traditional medicines for the treatment of diarrhoea, diabetes and inflammatory disorder. In the present study, we investigated the analgesic activity of the standardized hydroalcoholic extract was evaluated for its in-vivo analgesic activity by using the Eddy's Hot plate method in wistar rats. In both of the cases Diclofenac sodium was used as standard drug. The extract at the doses of 200 and 400 mg/kg elicited a significant analgesic activity in a dose-dependent manner by using Eddy's Hot plate method. The analgesic mechanism of activity of the standardized hydro alcoholic extract of P. Pinnata Linn. pain mediators may be the main mechanisms of action of P. Pinnata hydro alcoholic extract.

Keywords: Pongamia pinnata, analgesic, hydroalcoholic extract

A R T I C L E I N F O

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***Corresponding Author**
Salma Begum
MRM College of Pharmacy,
Chintapalliguda, Ibrahimpatnam,
R.R District-501510, India
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1. Introduction

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. Excessive pain may be unbearable and cause other effects like sinking sensation, sweating, nausea, palpitation, rise or fall in B.P, tachycardia. It is useful to distinguish two basic types of .pain, acute and chronic, and they differ greatly. Acute pain for the most part, results from disease, inflammation, or injury to tissues. This type of generally comes on suddenly, for example, after trauma or surgery, and may be accompanied by anxiety or emotional distress. The cause of acute pain can usually be diagnosed and treated, and the

pain is self-limited, that is, it is confined to a given period of time and severity. In some rare instances, it can become chronic. Chronic pain is widely believed to represent disease itself. It can be made much worse by environmental and psychological factors. Chronic pain persists over a longer period of time than acute pain and resistant to most medical treatment. It can often does cause severe problems for patients. Pain is an unpleasant feeling often caused by intense or damaging stimuli, such as stubbing a toe, burning a finger, putting alcohol on a cut, and bumping the "funny bone."[1] The International Association for the Study of Pain's widely used definition states: "Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage".[2]

Pain motivates the individual to withdraw from damaging situations, to protect a damaged body part while it heals, and to avoid similar experiences in the future.[3] Most pain resolves promptly once the painful stimulus is removed and the body has healed, but sometimes pain persists despite removal of the stimulus and apparent healing of the body; and sometimes pain arises in the absence of any detectable stimulus, damage or disease.[4] Pain is the most common reason for physician consultation in the United States.[5] It is a major symptom in many medical conditions, and can significantly interfere with a person's quality of life and general functioning.[6] Psychological factors such as social support, hypnotic suggestion, excitement, or distraction can significantly modulate pain's intensity or unpleasantness.[7][8]

2. Materials and Methods

Materials:

Hydro-alcoholic extract of Pongamiapinnata Linn, Distilled water, Ascorbic acid, Hydrogen peroxide, DPPH, H2SO4, Potassium Iodide, Mercuric chloride, Bismuth carbonate, Glacial acetic acid, Acetic acid, Aqueous picric acid, Benedict's Reagent, Fehling's solution, Ferric chloride, Pyridine, Lead acetate, Sodium chloride, NaOH, Ninhydrine solution, HNO3, NaNO2, α-napthol, Chloroform, Acetic anhydride, Aspirin, Lenoleic acid.

Methodology

Preparation of plant extract:

The leaves of Pongamiapinnata Linnwere dried for 20 days under the shade to prevent the loss of volatile oils. The shade-dried and powdered leaves were subjected to extraction with hydro- alcoholic extract by maceration .The hydro-alcoholic mixture was prepared by ethanol 70% and water in the ratio of 7:3. The filtrate was collected and concentrated on heating mantle to obtain a syrupy mass. The extracts were subjected to phytochemical study as well as pharmacological activity.

Employing in vivo model: Hot plate method:

Analgesic activity was tested in rats using the hot plate method of Janssen and Jagneau (1957). Eight rats were divided in to four groups. One group was given only distilled water and observed as a control. The second group was given Aspirin and treated as standard and other group was given test drugs i.e. HAOC 200 & 400 mg/kg. Swiss rats were placed in aluminum hot plate kept at a temperature of 55 ± 0.5 degree centigrade for a maximum time of 15 seconds. Reaction time was recorded when animals licked their paws or jumped. The responses were taken at different time interval i.e. 0,30,60,90,120,180 & 240 minutes after oral administration of hydro-alcoholic extract with dose of 200 and 400 mg/kg respectively. Cut off time in the absence of a response was 15 sec to prevent the animals from being burnt (Sharma et al., 1982).

Tail flick method:

Total of eight rats divided in the groups of three each, and three groups were made .One group was given only distilled water and observed as a control. The second group was given Aspirin and treated as standard and other group was given test drugs i.e. HAOC 200 & 400 mg/kg Aspirin was taken as standard drug. All the drugs were given intraperitonially. The tail flick latency was assessed by analgesiometer (INCO, INDIA).The strength of the current passing through the naked nichrome wire was kept constant at 6 amperes. The distance between the heat source and tail skin was 1. 5 cm. The site of application of the radiant heat in the tail was maintained at2.5c.m.measured from the root of tail. The cutoff reaction time was fixed at 10 seconds to avoid tissue damage.

Acetic acid writhing test:

Anti noociceptive response of the extract pongamia pinnata (200 and 400 mg/kg) was assessed by counting number of writhes (constriction of abdomen, turning of trunk and extension of hind legs) induced by 1% acetic acid solution (1mL:100 g) in rats. Number of writhes per animal was counted during 30 min test period, beginning 3 min after the injection of acetic acid. Acetyl salicylic acid 100 mg/kg body weight was used as as reference drug. Total of 8 rats divided in four groups .One group was given only distilled water and observed as a control. The second group was given Aspirin and treated as standard. Other groups were given test drugs i.e. HAOC 200 & 400 mg/kg.

3. Results and Discussions

Table 1: Mean Response of Hot Plate method at Various Time Interval

Treatment	Dose (mg/kg)	Mean Basal Time (Seconds)	Mean Response (in seconds) at Various Time Interval (in minutes)					
			30	60	90	120	180	240
Distilled water	0.5ml	4.39± 0.019	4.16± 0.186	4.69± 0.028	4.78± 0.041	4.19± 0.035	4.07± 0.047	4.55± 0.035
Aspirin	10	4.45± 0.057	7.68± 0.042	8.61± 0.025	9.47± 0.047	11.18± 0.038	10.68± 0.058	9.95± 0.041
HAOC	200	4.63± 0.037	4.87± 0.031	5.19± 0.035	5.26± 0.044	5.94± 0.046	5.69± 0.042	5.58± 0.020
HAOC	400	4.37± 0.038	4.94± 0.028	5.19± 0.025	5.95± 0.052	6.38± 0.024	6.06± 0.020	5.78± 0.027

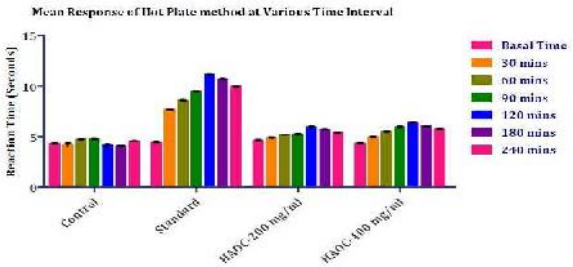

Figure 1: Mean Response of Hot Plate method at Various Time Interval

Table 2: Mean TFL of Tail flick method at various Time Interval

Treatment	Dose (mg/kg)	Mean Basal Time (Seconds)	Mean Response of Tail Flick method at Various Time Interval (in minutes)					
			30	60	90	120	180	240
Distilled water	0.5ml	4.19± 0.029	3.76± 0.041	4.68± 0.046	4.77± 0.041	4.57± 0.055	4.23± 0.047	4.07± 0.037
Aspirin	10	4.29± 0.045	7.88± 0.042	8.42± 0.042	9.47± 0.046	11.13± 0.056	10.68± 0.037	9.09± 0.041
HAOC	200	4.52± 0.037	4.41± 0.010	4.52± 0.031	5.32± 0.013	5.77± 0.028	5.52± 0.022	5.38± 0.041
HAOC	400	4.21± 0.018	4.75± 0.016	4.89± 0.005	5.48± 0.025	6.82± 0.012	6.16± 0.0.0	6.07± 0.035

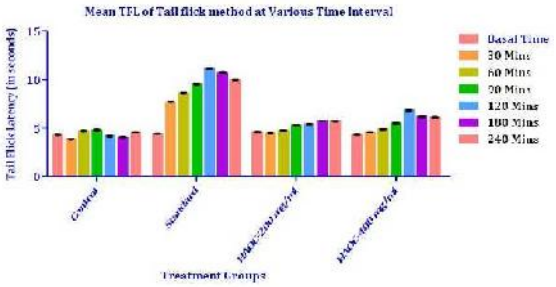

Figure 2: Mean Response of Tail flick method at Various Time Intervals

Table 3: Mean writhes of Acetic acid writhing method

Treatment	Dose (mg/kg)	No. of Writhes	% inhibition
Distilled Water	10ml/Kg	76.66– 1.55	
Aspirin	5	42.15± 1.07	62.75%
HAOC	200	28.67– 0.68	45.05%
HAOC	400	31.08– 0.88	59.19%

Statistical analysis:

Data are expressed as mean ± SEM (standard error of mean) for five animals. The difference among means has been analyzed by student- t test.

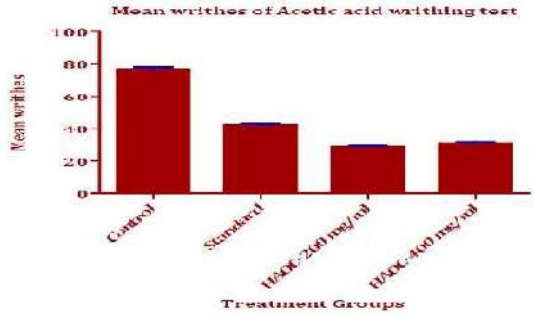

Figure 3: Mean writhes of Acetic acid writhing method

Discussion

Phytochemical screening:

Phytochemical study shows that flavones and flavonoids are mostly present in hydroalcoholic extract of Pongamia pinnata Linn (countering inflammatory, bacterial, viral, microbial, hormonal, carcinogenic, neoplastic and allergic disorders) by neutralizing all types of oxidizing radicals including the super oxide and hydroxyl radicals and by chelation. A chelator binds to metal ions in our bodies to prevent them from being available for oxidation. Also they inhibit oxidation enzymes in cells. Flavonoids also act as powerful chain breaking antioxidants due to the electron donating capacity of their phenolic groups. Flavonoids reduce the oxidation of low density lipoproteins and also prevent platelet aggregation by inhibiting the activity of the enzyme cyclooxygenase (V. Naveen Kumar H Het al., 2009)

***In-vivo* study**

For the purpose of investigation of analgesic activity of this plant, we used three methods, the hot plate method, tail flick method and acetic writhing method. is rich in flavonoids, thus the results indicate that hydro-alcoholic leaf extract of Pongamia pinnata Linn have potent antioxidant activity and also the active principles responsible for biological activity are present. The test drug Pongamia pinnata Linn extract (hydro-alcoholic) has been used in the dose of 200 and 400 mg/kg body weight. Analysis of tables and figures shows that the Aspirin group has significant effect as compared to distilled water treated group, whereas the hydro-alcoholic extract of Pongamia pinnata Linn also have significant effects when compared with distilled water treated group and it can be chosen as primary analgesic.

4. Conclusion

The present study shows that hydro-alcoholic extract of *Pongamia pinnata*in the doses of 200 and 400mg/kg are able to produce a consistent reduction in algesia/ nociception. Further the extracts have also shown presence of active constituents responsible for various biological activities. Though they didn't produce effect as their respective standard but they still can be chosen as primary analgesic.

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