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ANTINOCICEPTIVE SCREENING OF METHANOL EXTRACT OF *SOLANUM PUBESCENS*

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ABSTRACT

Findings of this study may help efficacy and potency of herb as an analgesic. The methanol extract of *Solanum pubescens* was examined for its central analgesic activity by using Tail flick method, Tail immersion, Acetic acid method in albino mice. The doses administered were 300mg/kg P.o. The pentazocin 10mg/kg I.P and aspirin 100mg/kg P.o was taken as standard drug. Data analysed by ONE way ANOVA test followed by Dunnett's test. All the results were expressed as mean ± SEM P<0.05 was considered as significant. The animal that administered of 300mg/kg leaf extract has shown the maximum analgesic activity comparable to pentazocin (P<0.001). The analgesic was observed after 60 min of drug administration and showed wearing off after 120 min, and methanol extract of *Solanum pubescens* has central analgesic activity involving spinal as well as supra spinal mechanisms. This activity may be due to saponins found in the extract. Extrapolation of findings in clinical situation how ever needed to develop it as novel analgesic.

Key words: *Solanum pubescens*, Analgesic, Tail flick, Tail immersion, Acetic acid.

INTRODUCTION

Pain is universally understood as a signal of disease and it is the most common symptom that brings a patient to a physician attention, requiring treatment with analgesic agents (Vongatau HO *et al*., 2004). Herbal medicines derived from the plant extracts are being increasingly utilized to treat a wide variety of clinical diseases, though relatively little knowledge about their mode of action is available. The present investigation was to scientifically prove the analgesic potential of *Solanum pubescens*. Other species of *Solanum* genus have been scientifically proven for analgesic activity. But no such scientific data is available for *Solanum pubescens.* Traditionally *Solanum pubescens* has been used in the treatment of head ache's menstrual pain, rheumatoid arthritis, tuberculosis, ulcers, etc. so, *Solanum pubescens* was selected for the pharmacological evaluation of analgesic activity.

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PLANT PROFILE

Solanum pubescens

Solanum pubescens belong to the family solanaceae commonly called as pajarito and commonly used in India by the tribal people for the treatment of liver disorders, diarrhoeal diseases and cancer disorders (Hemamalini K *et al*., 2011).

MATERIAL AND METHODS

Present studies have been conducted in the Department of Pharmacology at T.R.R.C.P. The experimental protocol was approved by institutional animal ethics committee (IAEC).

PLANT MATERIAL

The leaves of *Solanum pubescens* were procured from S.V. University, Tirupathi and a specimen voucher was placed in the library. The leaves were washed under running water, shade dried and the dehydrate leaves powdered to a fine texture and 100g of the dried leaves was repeatedly extracted with 95% methanol for 24hrs.

PHYTO CHEMISTRY

The plant contains triterpenoid saponins possessing various major chemical constituents. Other constituents of the plant are water soluble base and alkaloids. The methanol extract of the plant contain flavonoids and tannins.

EXPERIMENTAL ANIMALS

Wistar albino mice of either sex weighing 35-40gms bred in NIN facility were used for the study. The animals were housed under standard laboratory conditions maintained at natural light & dark cycle and had free access to food and water. They were acclimatized to laboratory conditions before the experiment. Each animal was used once in every experiment and all the experiments were carried out in day light.

ACUTE TOXICITY STUDY

Extract was given in the dose range 300mg-3000mg/kg p.o and acute toxicity was carried out in albino mice by method of OEDC (organization for economic co-operation and development, guideline No. 423.

TEST METHODS

Animals were divided into various groups in such a way that 6 animals were there in each group. Animals treated with 5% Gum acacia suspension (0.1ml P.o) served as control Group I, Pentazocin 10mg/kg bodyweight i.p served as standard Group II and animals in test Groups III were treated with 300mg/kg p.o of methanolic extract of *Solanum pubescens*. Each animal was treated with respective drug 30min before experimentation. Following are the details of experiments performed.

Tail flick response method (Flecknell PA, 1996; Turner RA, 1965a)

Mice are held in a suitable restrainer with the tail protruding out. Basal reaction time of animals to radiant heat is recorded by placing the tip (last 1-2 cm) of the tail on the radiant heat source, i.e. heated nichrome wire of analgesiometer. The tail withdrawal from the heat (flick response) is taken as the end point. The animals which show flicking response within 3-5 secs are selected for the study. A cut off period of 15 secs is observed to avoid damage to the tail. The measurements of with drawal time using the tail flick apparatus conducted at 30, 60, 120 & 180 min after administration of drug.

Tail immersion test (Toma W *et al*., 2003)

The procedure is based on the observation that morphine like drugs selectively prolongs the reaction time of the typical tail withdrawal reflex in mice. The animals of the control, positive control and test group were treated with Nalbuphine 10mg/kg body weight, 5% acacia as control & test samples at the dose of 300mg/kg of *Solanum pubescens.* 1-2 cm of the tail of mice was immersed in warm water kept constant at 55°C. The reaction time was the time taken by the mice to deflect their tails. The first reading was discarded and the reaction time was recorded as a mean of the next three readings. A latency period of 20 sec was defined as complete analgesia and the measurement was stopped when the latency period exceeded to avoid injury to mice. The latent period of the tail flick response was taken as the index of antinociception and was determined before and 0, 30, 60 & 90 min after the administration of drugs.

Abdominal writhing by acetic acid

Analgesic activity was evaluated by the test of abdominal writhing induced by acetic acid in mice. The animals were treated with 0.25ml of 0.6% acetic acid i.p into each group of mice after 30 min administrator of control, standard and extract treated group. 10 min later the writhes were counted over a period of 10 min (Koster R *et al*., 1959).

Stastistical analysis

Statistical analysis was carried out using one-way ANOVA followed by Dunnet's multiple comparisons. The results obtained were compared with the vehicle control group. The $P<0.005$ were considered to be stastistically significant.

RESULTS AND DISCUSSIONS

Acute toxicity study

Acute toxicity study for the methanolic extract of *Solanum pubescens* showed LD_{50} 3000mg/kg. Therefore for this study, animals were screened for doses 300mg/kg body weight of extract.

Table 1. Effects of the Methanolic extract of Solanum pubescens on Tail flick Response in mice

S.No	Groups	Latency period in different hours		
		0	1 hour	2 hour
1.	Control	1.72 ± 0.27	1.50 ± 0.11	2.06 ± 0.44
2.	Positive Control	1.81 ± 0.20	4.56 ± 1.60*	2.13 ± 0.35
3.	Test (*Solanum pubescens*)	2.11 ± 0.25	3.78 ± 0.54*	3.02 ± 0.44

Mean value of tail flick method latency (sec) ± S.E.M *P<0.01.

Table 2. Effects of the methanolic extract of Solanum pubescens on Tail immersion test and Acetic acid induced writhing in mice (T.I.T)

S.No	Groups	Dose mg/kg	Latency period Mean ± S.E.M	Percentage protection	Number of writhings	Percentage protection
1.	Control	0.1ml	3.33 ± 0.58	-	37.67 ± 1.23	-
2.	Standard	10mg/kg	6.00 ± 0.58	80	12.83 ± 0.70	65
3.	MESP	300mg/kg	5.7 ± 0.58	70	18.33 ± 1.13	51.34

Mean value of tail flick method latency (sec) ± S.E.M *P<0.01.

Tail flick method

The analgesic activity of pentazocin *Solanum pubescens* leaf extract (300mg/kg) was assessed by Tail flick respeonse method. Pentazocin (10mg/kg) treated group showed significant analgesic activity at 30, 60, 90 and 120 min when compared to control. Leaf extract of *Solanum pubescens* at 300mg/kg did not show significant analgesic activity at 60 min but the animals showed analgesic activity at 120 min.

DISCUSSION

The analgesic activity of different plants such as *Solanum pubescens* was investigated in the present study. The mechanism for testing analgesic activity was selected such that both centrally and peripherally mediated effects were investigated. The acetic acid induced abdominal construction and tail immersion methods elucidated peripheral & central activity respectively. The extracts 300mg/kg, administered orally, significantly inhibit acetic acid induced writhing in rats. There writhing are related to increase in the peritoneal level of prostaglandins and leukotrienes (Deraedt R *et al*., 1980). The result strongly suggests that the mechanism of action of extract may be linked to lipoxygenase and/or cyclooxygenase. Tail immersion model of analgesic assessment is best reserved for evaluating compounds for centrally acting analgesic activity. The extracts 300mg/kg shows best effect after a latency period of 6 hrs which is more than other fractions.

CONCLUSION

In the present study analgesic activity of leaves of *Solanum pubescens* was investigated by means of acetic acid induced writhing, tail immersion and tail flick in rats. The oral administration of different extracts showed analgesic activity by link to lipoxygenase & cyclooxygenase. The result strongly suggests that the extract can be used efficiently as analgesic agents.

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