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Research Article

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ANALGESIC ACTIVITY OF ROOT EXTRACT OF *SOLANUM MELONGENA* LINN ROOT

Srivastava Ashish*, Sanjay Yadav
Department of Pharmacy, Saroj Institute of Technology and Management Lucknow, UP, India

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***Corresponding author**
Ashish Kumar Srivastav, Student, Email: ashish.srivastav78@yahoo.com

ABSTRACT
The present study was aimed at Pharmacognostic study and biological evaluation of analgesic activity of plants roots. The roots of plants were studies for Pharmacognostic characteristics namely, morphology, microscopy, physicochemical parameters, which can be of utilized in identification/authentication of the plant and/or its roots in crude drug form. The preliminary phytochemical screening of the dry residue was carried out by the chemical test and thin layer chromatographic method. The preliminary phytochemical screening of dry residue showed the presence of Saponins, Alkaloids, Glycoside, and Flavonoids in various extracts. However most of the medicinally potential phytoconstituents were present in methanolic and aqueous extracts. The Hydroalcoholic extract was selected for Biological screening due to high alcoholic-soluble extractive value, high yield of successive alcoholic extract and TLC results. The analgesic screening was done using Hot plate method, Tail immersion methods and acetic acid induced in rats and mice. Hydroalcoholic extract was administered orally at the acute doses of 200mg/kg and 400mg/kg b.w. Several activities on these doses have already been reported. Both the doses showed significant ($p<0.05$) analgesic activity.
KEY WORDS: Brinjal, *Solanum melongena* Linn, analgesic activity

INTRODUCTION

Solanum melongena Linn. (Brinjal; Solanaceae), a culinary vegetable, has been in use in the Indian system of medicine. Various parts of the plant are useful in the treatment of inflammatory conditions, cardiac debility, and neuralgia, ulcers of nose, cholera, bronchitis and asthma[1]. Its antioxidant[2,3], analgesic[4] and hypolipidemic[5] activities have been reported. Egg plant contains a higher content of free reducing sugars, anthocyanin phenols, Glycoalkaloids[6]. Egg plant is known to have some medicinal properties and said to be good for diabetic patients. It has also been recommended as an excellent remedy for liver complains and they can be used in the treatment of high blood cholesterol & helps to block the formation of free radicals and is also a source of folic acid and potassium[7]. The present study was initiated to evaluate the antipyretic and analgesic activity of dry residue of root juice of *Solanum melongena*.

MATERIALS AND METHODS

Drug and chemicals

Acetic acid was obtained from Merck, Germany. Acacia was purchased from Beximco infusion Ltd. Diclofenac sodium was obtained from square pharmaceutical Ltd Bangladesh. Methanol & Ethanol (Sigma, U.S.A.)

Plant Material

The Plant *Solanum melongena Linn* is selected on the basis of its use in Indian system of medicine and other Ethanobotanical resources in literature. Fresh roots of *Solanum melongena Linn* were collected from Vill+Post Koriyapar Distt. Mau and Identity of plant was confirmed and authenticated by taxonomy herbarium division of National botanical research institute (N.B.R.I), Lucknow, where voucher specimen has been deposited. (Reference no 97376).The collect plant parts were dried for one week and ground in to a coarse powder with help of a suitable grinder. The powder were stored in an air tight container and kept in cool, dark and dry place until analysis commenced

Animal

Swiss albino mice (6-8 weeks) of either sex weighing 25-30 g and male Wistar rats weighing 150-200 g were used. They were housed in light controlled room (12:12h) and at constant temperature (22+2^{O}C) conditions. Animals were fed with standard laboratory diet and water[8-9].

Preparation of the extract

The Hydroalcoholic extract was selected for Biological screening due to high alcoholic-soluble extractive value, high yield of successive alcoholic extract and TLC results. Shade dried root of *Solanum melongena* of plant pulverized and 70g of the crude drug powder was extracted with ethanol and water in a Soxhlet extractor. The liquid extract was concentrated in a rotary flash evaporator. It rendered a gummy concentrated of reddish brown colour. The residue was dried in desiccators over sodium sulfite. The extract was transferred to a closed container for further use and protection. The Preliminary phytochemical screening of the dry residue was carried out chemical test and chromatographic method[10-11].

Procedure for testing analgesic activity

Hot plate method

Experimental animals of either sex were randomly selected and divided in to four groups designated as group-I, group-II, and group-III; group IV, consisting of five mice in each group for control, Standard, and test sample group respectively. Each group received a particular treatment i.e. control (2% acacia) Standard (Diclofenac sodium 25mg/kg, p.o.) and test sample (Hydroalcoholic extract of 200mg/kg, p.o. & 400mg/kg, p.o. respectively) .The Animal were positioned on Eddy's hot plate kept at a temperature of 55^{0}c to 56^{0}c . A cut off period of 15sec was observed to avoid damage of the paw. Reaction Time was recorded when animals licked their fore or hind paw, or jumped prior to and 0, 30, 60, 2hr., 3hr, and 4hr after the oral administration of the sample.[12]

Acetic acid induced writhing method

The analgesic activity of the sample of the sample was evaluated using acetic acid induced writhing method in mice. In this method, acetic acid is administered intra-peritoneally to the experimental animals to create pain sensation. As a standard NSAID drug can be used .In the present study Diclofenac sodium was used to serve the purpose. The Plant extract was administered orally in two different doses (200 and 400 mg/kg body weight) to the Swiss Albino mice after an overnight fast. Test sample and vehicle were administered orally 30 minutes prior to intraperitoneal administration of 0.6% v/v acetic acid solution but Diclofenac sodium was administered 15 minutes prior to acetic acid injection .Then the animals were placed on an observation table. Each mice of all group were observed individually for counting the number of writhing they made in 15 minutes commencing just 5 minutes after the intraperitoneal administration of acetic acid solution. Full writhing was not always

accomplished by the animal, because sometimes the animals started to give writhing but they did not complete it. This incomplete writhing was considered as half –writhing. Accordingly, two half – writhing were taken is as one full writhing .The number of writhes in each treated group was compared to that of a control group while Diclofenac sodium (25mg/kg, p.o.) was used as a reference substance[13].

Tail immersion method

In present study analgesia was assessed according to the method of Luiz *et al* .Mice divided in the group of five each, were held in position in a suitable restrainer with the tail extending out. 3-4 cm area of the tail was marked and immersed in water bath thermo-statistically maintained at 51^0c .The withdrawal time of the tail from hot water (in seconds) was noted as the reaction time or tail flick latency. The maximum cut off time for immersion was 180 seconds to avoid the injury of the tissue of the tail. 2% acacia solution was administered to control the animal, plant extract in dose of 200 mg/kg and 400 mg/kg were given orally by intubation .The initial reading was taken immediately before administration test and standard drugs 0, 30, 60, 2hr., 3hr, and 4hr after the administration .Tail flick latency difference or mean increase in latency after drug administration was used to indicate the analgesia produced by test and standard drug.[14-15]

Statistical Analysis

Data were analyzed by one-way ANOVA followed by Dunnet's test and p value < 0.05 were consider statistically significant

RESULTS

The preliminary phytochemical screening of the dry residue showed the presence of flavonoids, alkaloids, Tannins and steroids. In acetic acid –induced writhing test Hydroalcoholic extract (200&400 mg/kg) reduced writhing count significantly (Table.1) and the results of hot plate test indicated a significant increase in reaction time at 3and 4h with 200&400mg/kg Hydroalcoholic extract, whereas reference drug Diclofenac sodium significantly increased the reaction time at 1and 2h (Table.2). In Tail –clip test indicated a significant increase in reaction time at 3and 4h with 200&400mg/kg Hydroalcoholic extract, whereas reference drug Diclofenac sodium significantly increased the reaction time at 2and 3h[16-17] (Table.3).

DISCUSSION

In the present study, *S. melongena* produced analgesic activity in a dose dependent manner and significant effect was observed at 200and400mg/kg. Generally, plants showing the analgesic effect. In an earlier report, the Hydroalcoholic extract of *S. melongena* was found to produce significant analgesic effect. A number of flavonoids have been reported to produce analgesic activity. Also, there are few reports on the role of tannins in analgesic activity. Hence, the present Analgesic activity of *S. melongena* may be attributed to the presence of alkaloids, flavonoids and tannins. The present study demonstrates the potential analgesic effect of *S. melongena*, which supports the claims by traditional medicine practitioners as an analgesic remedy[18-19] .

Table 1: Effect of crude extract on acetic acid induced writhing reponse in mice

Treatment	Does (mg/kg) b.w.	Number of writhes (per 30 sec)	Percentage of inhibition
Control (2%acacia)	0.1 ml/mg	46.33±1.31	_
Standard (Diclofenac sodium)	25 mg/kg b.w.	8.33±0.31**	82.01
Test 1 (Hydroalcoholic extract)	200mg/kg b.w.	22.33±0.31**	54.67
Test 2 (Hydroalcoholic extract)	400 mg/kg b.w.	18±0.34**	61.34

Experimental group were compared with control P value (<0.01)

Value are mean ± SEM (n=6), Mean significant different (P<0.05), P value summary **

Table 2: Analgesic effect of hydroalcohalic extract of root extract of *Solanum melongena* Linn in wister rat hot plate method

Treatment	Dose mg/kg b.w.	0 min	30 min	1hr	2hr	3hr	4hr
Control (2%acacia)	0.1 ml/mg	2.30±0.20	2.50±0.24	2.44±.0.21	2.32±0.23	2.34±0.25	2.33±0.21
Standard (Diclofenac sodium)	25 mg/kg b.w.	1.96±0.21	4.56±0.28	8.92±0.86	11.53±1.15*	10.76±0.96*	10.23±0.98*
Test 1 Hydroalcoholic extract	200 mg/kg b.w.	2.01±0.23	3.86±0.55	6.82±0.67	7.13±0.28*	6.36±0.36*	8.34.±0.38*
Test 2 Hydroalcoholic extract	400 mg/kg b.w.	2.12±0.17	4.39±0.69	7.71±0.52	8.14±0.60*	6.93±0.49*	7.02±0.53*

Experimental group were compared with control P value (<0.01)

Value are mean ± SEM (n=6), Mean significant different (P<0.05), P value summary * , *P<0.01; Significant difference from control (Dunnett's test)

Table 3: **Analgesic effect of hydroalcohalic extract of root extract of *Solanum melongena* Linn in wister rat tail immersion method**

Treatment	Dose mg/kg b.w.	0 min	30 min	1hr	2hr	3hr	4hr
Control (2%acacia)	0.1 ml/mg	3.95±0.33	2.510±0.24	1.74±.0.32	2.09±0.046	2.103±0.047	2.166±0.059
Standard (Diclofenac sodium)	25 mg/kg b.w.	3.4±0.38	3.967±0.45	3.171±0.44**	3.596±0.405**	3.667±0.490**	3.724±0.419**
Test 1 Hydroalcoholic extract	200 mg/kg b.w.	2.270±0.024	2.660±0.17	3.034± 0.168*	3.843± 0.192**	4.936± 0.255**	5.897±0.248**
Test 2 Hydroalcoholic extract	400 mg/kg b.w.	2.405±0.34	3.094±0.355*	3.324±0.32	3.241± 0.384**	4.304± 0.365**	5.400± 0.353**

Experimental group were compared with control P value (<0.01)

Value are mean ± SEM (n=6), Mean significant different (P<0.05), * P<0.05; Significant difference from control (Dunnett's test).

**P<0.01; Significant difference from control (Dunnett's test)

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