

ANALGESIC ACTIVITY OF ROOT EXTRACT OF *ACORUS CALAMUS* LINN

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Summary

The methanolic extract of *Acorus calamus* Linn, Araceae was screened for central analgesic activity using hot plate method in mice. The hot plate test results indicated that root extract of *A. calamus* prolonged the reaction latency period to pain thermally-induced in mice, similar to standard drug Pentazocine. The extract was significantly (P<0.01) prolonged, the hot plate reaction time up to 120 minutes with 200 mg/kg of extract, where as pentazocine also significantly(P<0.001) prolonged the reaction time up to 120 min. with 5 mg/kg. After 120 min., the reaction time was declined with root extract and also standard drug. It is clear that, the methanolic root extract of *A. calamus* has significant analgesic activity and lend pharmacological support to suggested folkloric uses of the plant in the management of painful conditions.

Key words: *Acorus calamus*, Analgesic activity, Pentazocine, Araceae

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Introduction

Acorus calamus Linn. belonging to family *Araceae*, commonly known as “Sweet flag”. The plant is a semi-aquatic, perennial herb, with creeping rhizomes found in the northern temperate and sub-tropical regions of Asia, North America, and Europe. The rhizomes were utilized extensively by the Chinese, Indians and American Indians as well as the other cultures, many of the uses continue to day [1]. The rhizomes and its constituents, particularly α - and β -asarone, possess a wide range of pharmacological activities such as sedative, anticonvulsant, behavior modifying, memory enhancing, acetylcholinesterase inhibitory, cardiovascular, anti-inflammatory, antioxidant, antispasmodic, hypolipidemic, immunosuppressive, antioxidant, cytoprotective, antidiarrheal, antimicrobial, anthelmintic, insecticidal, adulticidal, diuretic, genotoxic, and mutagenic activities [2]. It has been used in traditional medicine for the treatment of digestive disorders and childhood colic. Infusions of the rhizome have been suggested for the treatment of fever, and chewing the rhizome has been said to relieve irritated throats and to remove the odor of tobacco [3]. This plant is also used externally to treat skin eruptions, rheumatic pains and neuralgia. *A. calamus* root has a long history of medical usage. It is known as an old folk remedy for the treatment of arthritis, neuralgia, diarrhea, dyspepsia, hair loss and other disorders. An infusion of the root can bring about an abortion whilst chewing the root alleviates toothache and the juice of the root is applied to boils, carbuncles, and painful joints.

However, to the best of our knowledge, there are no scientific data available to validate the central analgesic activity of the plant. The aim of this study was to investigate the analgesic activity of the methanol root extract of the plant on mice

Methods

Materials: Pentazocine pure substance was purchased from Cadilla Health Care Ltd, Ahmedabad, India.

Preparation of the plant extract: The whole plant, *A. calamus* was collected from sub-tropical regions of Warangal town, Area of Andhra Pradesh State, India. The plant was identified and authenticated at the Herbarium Section in the Department of Botany, Kakatiya University, Warangal, Andhra Pradesh. The root was cleaned and air dried for 20 days and then crushed into coarse powder with a pestle and mortar. About 300 g of the powdered root bark was extracted with 1000 ml methanol for 3 days using borosil extraction apparatus. The solvent was evaporated on a water bath. The extract was then stored at 4°C until further use.

Animals: Swiss albino mice weighing 25-30g obtained from Mahaveer Enterprises, Hyderabad, Andhra Pradesh, India. The selected animals were housed five per each of acrylic cages at 25°C, 45-55% humidity and 12/12 h light/dark under controlled environment. Mice were fed with standard laboratory diet and water was given *ad libitum*.

Hot plate method: The hot plate latency assay was based on the method of [4]. The temperature of the hot plate was maintained at 55 ± 1 °C. Briefly in this method, mice in second, third and fourth groups were given extracts of *A. calamus* orally after 12 h fast. The dosages were 50, 100 and 200 mg/kg for the rats in second, third and fourth groups, respectively. The mice in first and fifth groups were given doses of normal saline (10 ml/kg) and Pentazocine (5 mg/kg), respectively. A mice from group second was placed on the hot plate after the extract had been given and the reaction time for the animal to lick the paw or jump from the hot plate was taken as the latency (s). This was also repeated at 60 and 120 min from the time the extract was given. The whole procedure was repeated for all the mice in the group and the average of the latency was determined from the six mice in the group. The mean latency for each group (first, third, fourth and fifth) was determined using the same procedure.

Statistical analysis: The results are represented as mean \pm S.E.M and the significance calculated using student's 't' test.

Results

Effect of bark extract on thermally induced pain (hot plate) represented in figure1.

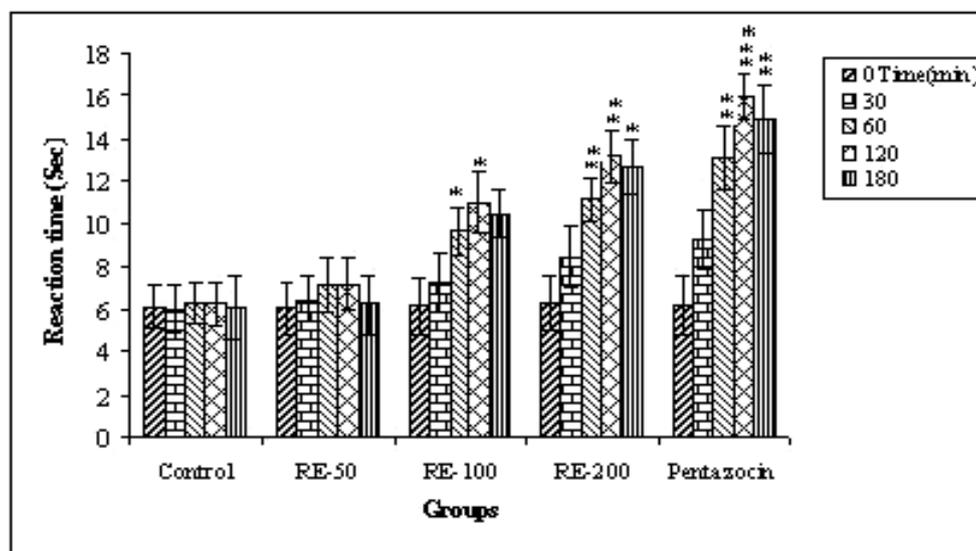


Figure.1 Effect of methanolic root extract of *A. calamus* on thermally induced pain stimulus in mice; Data values were expressed as Mean \pm S.E.M (n=6); *P<0.05, **P<0.01, ***P<0.001 when compared to control; RE- Root Extract.

The extract significantly protected the mice against thermally induced pain stimulus in mice. The reaction time of mice at the dose of 200mg/ kg root extract of *A. calamus* prolonged significantly (P<0.01), the pain latency increased up to 120 min., where as Pentazocine (5mg/kg), the standard drug also significantly (P<0.001) prolonged up to 120 min.

However, there was a decline in the reaction time after 120 min. was observed by standard drug and root extract. No analgesic activity was observed when methanol was used as control.

Discussion

Extract of roots of *A. calamus* has demonstrated analgesic activity by prolonging reaction latency to thermally induced pain in mice. The extract increases mice reaction time on hot plate. Hot plate test is the most common test of nociception that are based on a phasic stimulus of high intensity [5]. Pain induced by thermal stimulus of the hot plate is specific for centrally mediated nociception [6]. The ability of the extract to prolong the reaction latency to pain thermally-induced in mice by the hot plate further suggests central analgesic activity.

The difference between the mean reaction time of the *A. calamus* treated groups and the control group was statistically significant at 100 and 200mg/kg doses tested. Its effect was comparable to centrally acting standard drug, pentazocine which had a maximum mean reaction time of 120 min with 5mg/kg ($p < 0.001$). The central analgesic action of the plant extract might be mediated through inhibition of central pain receptors, indicated that the *A. calamus* root might be centrally acting.

The analgesic effect of the root of *A. calamus* has not been previously reported. The centrally acting analgesic drugs elevate the pain threshold of mice towards heat and pressure [7]. From the above findings, the extract raises the pain threshold on the hot plate which indicates that it might be centrally acting. The extract thus seems to possess analgesic properties, which are mediated via centrally acting mechanisms. In conclusion, this work provides a rationale for the use of this plant in folkloric treatment of pain.

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