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Evaluation of analgesic activity of ethanolic extract of *Strobilanthes ciliatus* Nees

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Abstract

Objective: The present study was aimed to investigate the phytochemical analysis and analgesic activity of ethanolic extract of stem of *Strobilanthes ciliatus* Nees.

Methods: The *Strobilanthes ciliatus* plant powder was extracted with ethanol by cold maceration technique. Primary and secondary metabolites in the plant extract were identified by means of phytochemical screening or specific tests. The *in-vivo* analgesic activity was subsequently assessed by tail-clip method.

Results: The phytochemical screening showed the presence of flavanoids, phenolic compounds, tannins, steroids, glycosides and triterpenoids. The *in vivo* study revealed that the extract has analgesic activity

Conclusion: The present study provides a biochemical rationale by which *Strobilanthes ciliatus* Nees elicited effect on pain. Analgesic property of plant extract at a dose of 100mg/kg was evaluated against the standard drug Diclofenac at a dose of 20mg/100g using tail clip models of pain. The extract of *Strobilanthes ciliatus* Nees showed more significant analgesic activity ($p < 0.001$) as compared to standard drug.

Keywords: *Strobilanthes ciliatus* Nees, phytochemical screening, analgesic activity, tail-clip method

1. Introduction

Analgesia is defined as a state of reduced awareness to pain and analgesics are the substances which reduces pain sensation by increasing the threshold to painful stimulus. *Strobilanthes ciliatus* belongs to the family Acanthaceae and have got high reputation in traditional medicinal practice mainly due to its excellent medicinal properties. *Strobilanthes ciliatus* is a small shrub distributed at an altitude of about 1200 m in the evergreen forests of Western Ghats. In Indian system of medicine this plant has got extensive considerations due to its extensive uses.

The root, bark, leaves of the plant possess various therapeutic effects such as depurative, expectorant, jaundice, diuretic, anti-inflammatory, leprosy, diabetes, dropsy and fever. It is also having hepatoprotective analgesic and DNA protective effect. Previous investigations on the plant *Strobilanthes ciliatus* Nees have lead to the isolation of stigmaterol, lupeol, taraxerol, butelin, 4-acetyl-2,7-dihydroxy-1,4,8-triphenyloctane-3,5-dione and stigmaterol glycoside. Review analysis on this plant revealed that not much work has been done on this plant in terms of its bioactivity related to analgesic activity. Therefore, the present study has been designed to prove the phytochemical and therapeutic potential of the plant *Strobilanthes ciliatus*.

Materials and Methods

Plant material

The plant *Strobilanthes ciliatus* was collected from Kerala and authenticated. The collected plant was shade dried and powdered.

Preparation of Plant Extract

The ethanolic extract of plant was prepared by cold maceration method. g of coarsely powdered sample was macerated with ethanol. The residue was removed by filtration and the ethanolic extract was evaporated to get a solid mass. The crude extract was stored in refrigerator at 2-8°C for subsequent experiment. The extract was reconstituted with ethanol for further analysis

Phytochemical screening of plant extracts

The freshly prepared crude ethanolic extract was subjected to phytochemical screening for

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identifying the primary and secondary metabolites such as flavanoids, alkaloids, steroids, phenolic compounds, saponins and tannins present in the plant extract using the standard procedure.

Physico-chemical standardization

The various physico-chemical parameters considered were Loss on drying, Ash values (Total ash, acid insoluble ash, water soluble ash) and extractive values for plant powder were performed according to standard methods.

In vivo analgesic activity

Acute oral toxicity studies

Healthy Swiss Albino mice weighing 20-25g were used for the acute toxicity study. The test doses were fixed with reference to the OECD Guidelines 423. Graded doses of the extract were administered to groups of mice of either sex (6-7 in a group) at a constant volume (10ml/kg in mice). The control group received vehicle alone. The animals were observed continuously for each four hour to detect any changes in autonomic or behavioural responses such as spontaneous activity, irritability, urination, salivation and corneal reflex. Any mortality during the experimental period of 14 days was also recorded.

Analgesic activity by tail-clip method.

The healthy adult Swiss Albino mice with the weight ranging from 20-25 were divided into four groups each contains n=7 animals. The Group one received only saline, Group two received Diclofenac 20mg/100g, Group three received 100 mg/kg body weight of ethanolic extract respectively. The compounds administered before 15 min of the experiment and the artery clip were applied to the root of the tail approximately 1-2 cm to induce the pain. A sensitivity test was carried out and animals that were not attempted to dislodge the clip within 10 seconds were discarded. The noxious responses of the animals were noted (biting of the tail near the location of the clip).

Tail clip treatment was carried out as;

Group 1: Control (Saline received)

Group 2: Standard (Diclofenac 20mg/100g received)

Group 3: Test 1 (Extract of 100 mg/kg received)

Results

Table 1: Results of qualitative phytochemical screening of ethanolic extract of *Strobilanthes ciliatus* Nees

Phytoconstituents	Chemical test	Result
Flavanoids	Shinoda test	+
Tannins	Ferric Chloride test Lead acetate test	+
Alkaloids	Mayer's test Hager's test Wagner's test Dragendorff's test	-
Carbohydrates	Molisch test Fehling's test	+
Saponin Glycosides	Foaming test Haemolytic test	+
Sterols	Salkowski's test Liebermann -Burchard test	+
Proteins and Amino acids	Biuret test Ninhydrin test	-
Fixed oils and fats	Spot test	-
Terpenoids	Noller's test	+

Acute toxicity studies

In acute oral toxicity studies no mortality was recorded in these animals up to 14 days. Thus the extract was non-toxic up to 1000mg/kg.

Analgesic activity

The time response to the noxious stimuli was noted. There was a significant increase in the analgesic activity in the standard and test treated animals

Statistical analysis

All the values of *in vivo* analgesic studies of ethanolic extract of *Strobilanthes ciliatus* as mean and standard error of mean and was examined for significance by ANOVA and groups were compared by Dunnett's test for individual comparison of groups with control. P value shows more significant at P<0.01 level.

Discussion

Strobilanthes ciliatus belongs to the family Acanthaceae and is commonly known as Karimkunj. The present study was conducted to find out the analgesic activity of stem part of ethanolic extract of *Strobilanthes ciliatus*. In acute toxicity testing no mortality was observed in mice.

Sl. No	Animal	Response before drug administration	Response after drug administration	Difference
1	Control	10 sec	15 sec	5
2	Standard	13 sec	240 sec	227
3	Test	12 sec	120 sec	108

Conclusion

The usefulness of *Strobilanthes ciliatus* in the treatment of pain has been significantly validated by the results of the present study. The stem of *Strobilanthes ciliatus* was found to have analgesic activity. The study indicates that the data obtained will be basis for further studies and application of this plant.

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