e - ISSN - 2348 - 2168
Print ISSN - 2348 - 215X

Acta Biomedica Scientia

Journal homepage: www.mcmed.us/journal/abs

INFLUENCE OF *TABERNAE CORYMBOSA* ROOT EXTRACT ON CENTRAL NERVOUS SYSTEM MEDIATED MUSCLE COORDINATION IN EXPERIMENTAL ANIMAL

Sridhar VR[1], Jayakumar P[2], Arun Seetharaman[1], Jaikumar S[3*]

[1]Department of Psychiatry,Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry, India.
[2]Department of Pediatric Surgery, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry, India.
[3]Department of Pharmacology, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry, India.

Article Info

Received 29/05/2016
Revised 16/06/2016
Accepted 19/06/2016

Keywords :-
Tabernae corymbosa, Actophotometer, Rota-rod, Diazepam, Motor coordination.

ABSTRACT

The aim of present study is to evaluate the effect of ethanolic root extract of *Tabernae corymbosa* on Central Nervous System mediated motor coordination in mice. The ethanolic root extract was prepared and subjected to phytochemical evaluation which shows the presence of carbohydrates, alkaloid, phenols, saponins, sterols and tannins. To evaluate the motor coordination locomotor action, muscle relaxation and sedative activities were studied using Actophotometer, Rota-rod and phenobarbitone induced sleeping time models in mice. The animals were divided in to 3 groups of 6 animals each. Diazepam (4mg/kg) was used as reference control for locomotor and muscle relaxation study, chlorpromazine (5mg/kg) was used in phenobarbitone induced sleeping time. 250mg/kg of ethanolic root extract of *Tabernae corymbosa* was used in all the studies. All the test drugs were administered by suspending in 0.1% Carboxy Methyl Cellulose solution. In locomotor motor activity, the ethanolic root extract of *Tabernae corymbosa* significantly ($P<0.001$) decreased the score to 94.58±5.52 and the percentage decrease in the locomotor activity of *Tabernae corymbosa* was 58.21%. In muscle relaxant study, the ethanolic root extract of *Tabernae corymbosa* significantly ($P<0.001$) decreased the time to 34.55±2.86 seconds. In phenobarbitone induced sleeping time, the ethanolic root extract of *Tabernae corymbosa* significantly ($P<0.05$) increased the phenobarbitone induced sleeping time (49.72±2.25 minutes) when compared to control groups. From the results, it was concluded that, the ethanolic root extract of *Tabernae corymbosa* exhibits decrease in locomotor activity, muscle relaxant activity and sedative property.

INTRODUCTION

Tabernae montana is a genus from the plant family, Apocynaceae. It is widely distributed in tropics and subtropics of Africa, Americas and Asia. *Tabernae corymbosa* (Roxb. ex Wall.) is a wild plant growing as shrub or small tree with a height of 3 m. The plant is glabrous except for its soft scented flowers; it generally grows throughout the year.

Globally, almost all parts of *Tabernae montana* species such as fruits, leaves, sap, latex, stem bark, root bark and whole plants are used for ethnomedicinal purposes. *Tabernae montana* species have a vast range of traditional medicinal applications that include using as decoctions and steam water baths for wound healing and treatment of syphilis, respectively. Decoction from roots, latex from fruits or grounded leaves from indigenous

Corresponding Author

S. Jaikumar
Email: - sengt@rediffmail.com

species is used as remedy for headache, constipation, flatulence and stomach ache [1]. The roots are processed as decoction and administered orally for treatment of fever, while a paste of the plant is used to treat orchitis [2,3]. The leaves of *Tabernae corymbosa* are used for treatment of fracture and tumours [3]. In Africa, the juice extracted from crushed roots classified as antimicrobial, antiparasitic and analgesic. Whereas, in Americas, Asia, Australia and Pacific regions, leaves and roots were mostly employed in, central nervous system (CNS) related illness, tumour, and as analgesic and febrifuge. Studies conducted on extracts or pure compounds of *Tabernae corymbosa* have reported pharmacological activities that included cytotoxicity, anthelmintic, analgesic and antinematodal antimicrobial, antioxidant, vasorelaxation activities [4]. Present study is conducted to establish the traditional claim of *Tabernae corymbosa* root extract on CNS activities in experimental animal models.

MATERIALS AND METHODS

Plant Collection

The plant of *Tabernae corymbosa* was collected from the road side of Pondicherry. The plant was identified as *Tabernae corymbosa* and authenticated by Scientist 'F' Botanical survey of India, Southern Regional Centre, Tamilnadu Agriculture University, Coimbatore. The Voucher specimen (BSI/SRC/74/46/14-15/Tech - 62) has been deposited in department for further references.

Preparation of Extract

The collected roots of *Tabernae corymbosa* was washed and shade dried. The dried roots were pulverized to get coarse powder using mechanical blender. The coarsely powdered plant material was then subjected to extraction by maceration process using 90% ethanol as a solvent at room temperature for 7 days with occasional shaking. The ethanolic extract was concentrated to dry. The collected extract was stored in desiccators and used for further pharmacological study.

Phytochemical Screening

Qualitative tests for the presence of plant secondary metabolites such as carbohydrates, alkaloids, tannins, flavonoids, proteins, saponins, phenolics, sterols and glycosides were carried out on the aqueous extract of *Tabernae corymbosa* using standard procedures [5].

Animals

Healthy adult Swiss albino mice of both sex, weighing about 20 -25 g were obtained from the animal house of Sree Lakshmi Narayana Institute of Medical Sciences, Pondicherry. The rats of either sex were isolated and housed in separate cages during the course of experimental period and kept them at room temperature (24± 2°C) with a 12 : 12 h light/dark cycle. The animals were fed with standard pellet diet and provided water *ad libitum*. All the procedures and protocols were reviewed and approved by the Institutional Animal Ethics Committee.

Drug Treatment

Mice were divided into three groups consisting of six animals each. Group I served as control, received 0.1% w/v of Carboxy Methyl Cellulose (CMC). Animals of group II received standard drug Diazepam at a dose of (4mg/kg, i.p.). Group III received the ethanolic extract of *Tabernae corymbosa* orally at a dose of 250 mg/kg. All the test drugs were administered orally by suspending in 0.1% CMC using gastric intubation tube.

Rota-rod Apparatus Test

The animals remained on Rotarod (25 rpm) for 5 min or more after successive trials were included in the study. After the administration of control, standard, and test extract, the fall off time from the rotating rod was noted after 30 min. The difference in the fall off time from the rotating rod between the control and the treated rats was taken as an index of muscle relaxation [6].

Locomotor Activity

The spontaneous locomotor activity was assessed with the help of a Actophotometer. Each animal was observed for a period of 5 min in a square closed field arena (30 cm × 30 cm × 30 cm) equipped with six photocells in the outer wall. Interruptions of photocell beams (locomotor activity) were recorded by means of a six digits counter. To see the locomotor activity, the Actophotometer was turned on and each mouse was placed individually in the activity cage for 5 min. The basal activity score for all the animals was noted. After 1 hour of test drug administration, the score were observed for 5 min. The difference in the activity, before and after drug administration, was noted. The percentage decrease in motor activity was calculated [6].

Phenobarbitone Induced Sleeping Time

The animals were divided into 3 groups of 6 animals each. Group I was served as normal control, received 0.1% w/v of Carboxy Methyl Cellulose (CMC). Group II was served as reference control, received Chlorpromazine (5 mg/kg). Group III received 250 mg/kg of the ethanolic extract of *Tabernae corymbosa*. All the test drugs were administered orally by suspending in 0.1% CMC solution. After 30 minutes of test drug administration, Phenobarbitone sodium (40mg/kg) was administered intra-peritoneal to all groups of animals. The time between the loss and recovery of the righting reflex was taken as the sleeping time [7].

Statistical Analysis

Results were expressed as mean ± SEM. The data were analyzed by using one way analysis of variance

(ANOVA) followed by Dunnet's '*t*' test using GraphPad version 3. P values < 0.05 were considered as significant.

RESULT

Phytochemical Analysis

The preliminary phytochemical analysis of the ethanaolic root extract of *Tabernae corymbosa* showed the presence of carbohydrates, alkaloid, phenols, saponins, sterols and tannins.

The locomotor activity and the muscle coordination of ethanolic root extract of *Tabernae corymbosa* was studied by using actophotometer and rota rod respectively in mice and the results were shown on table 1.

In locomotor activity, the score of animal treated with vehicle was 226.32 ± 6.94. The reference control diazepam and the ethanolic root extract of *Tabernae corymbosa* significantly (P<0.001) decreased the score to 74.58±3.87 and 94.58±5.52 respectively. The percentage decrease in the locomotor activity of diazepam and *Tabernae corymbosa* was 67.04% and 58.21% respectively.

In muscle coordination test, the time spent by the control animals was 274.32±8.77 seconds. The reference control diazepam and the ethanolic root extract of *Tabernae corymbosa* significantly (P<0.001) decreased the time to 21.56±1.82 seconds and 34.55±2.86 seconds respectively.

The effect of ethanolic root extract of *Tabernae corymbosa* was studied on phenobarbitone induced sleeping time mice and the results were shown on table I. Chlorpromazine is CNS depressant drug, which significantly (P<0.001) potentiates the phenobarbitone induced sleeping time (66.62±5.43 minutes) compared to control groups (35.77±1.48). The ethanolic root extract of *Tabernae corymbosa* significantly (P<0.05) increased the phenobarbitone induced sleeping time (49.72±2.25 minutes) when compared to control groups.

Table 1. Effect of ethanolic root extract of *Tabernae corymbosa* on locomotor activity and muscle coordination in mice

S.No	Groups	Actophotometer Test		Rota Rod Test
		1 hr after Drug Administration	Percentage Reduction	Time Spent (Sec)
1	Group I 0.1% CMC (10ml/kg)	226.32±6.94	-	274.32±8.77
2	Group II Diazepam (4mg/kg)	74.58±3.87***	67.04	21.56±1.82***
3	Group III *Tabernae corymbosa* (250mg/kg)	94.58±5.52***	58.21	34.55±2.86***

Datas were expressed as Mean ± SEM (n=6) *P<0.05, ** P<0.01 and *** P<0.001 Vs Control (Group I)

Table 2. Effect of ethanolic root extract of *Tabernae corymbosa* on phenobarbitone sodium induced sleeping time in mice

S.No	Drug Treatment	Sleeping Time (Minutes)
1	Group I 0.1% CMC (10ml/kg)	35.77±1.48
2	Group II Chlorpromazine (40mg/kg)	66.62±5.43***
3	Group III *Tabernae corymbosa* (250mg/kg)	49.72±2.25*

Datas were expressed as Mean ± SEM (n=6) *P<0.05, ** P<0.01 and *** P<0.001 Vs Control (Group I)

CONCLUSION

The present study was conducted to find out the influence of *Tabernae corymbosa* root extract on central nervous system mediated muscle coordination in mice. From the results, it was concluded that, ethanolic root extract of *Tabernae corymbosa* exhibited muscle relaxant activity which was mediated by its sedative property. The study may also be extended to isolate the active ingredient responsible for its centrally mediated muscle relaxant and sedative property.

ACKNOWLEDGEMENT: None

CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

REFERENCES

1. Van Beek TA, Verpoorte R, Baerhein Svendsen A, Leeuwenberg AJM, Bisset NG. (1984). *Tabernaemontana* L. (Apocynaceae): A review of its taxonomy, phytochemistry, ethnobotany and pharmacology. *J Ethnopharmacol*, 10, 1–156.
2. Ong HC, Chua S, Milow P. (2011). Ethno-medicinal plants used by the Temuan Villagers in Kampung Jeram Kedah, Negeri Sembilan, Malaysia. *Ethno Med*, 5, 95–100.
3. Wiart C. (2006). Ethnopharmacology of Medicinal Plants Asia and the Pacific. Hackworth J, ed. Totowa, New Jersey: Humana Press Inc.
4. Ibrahim BA, Hwei-San L. (2016). A review on ethnobotany, pharmacology and phytochemistry of *Tabernaemontana corymbosa*. *J Pharm Pharmacol*, 68, 423–432.
5. Harborne JB. (1998). Phytochemical Methods - A guide to modern techniques of plant analysis London, Chapman and

Hall.

6. Al-Naggar TB, Gomez-Serranillos MP, Carretero ME, Villar AM. (2003). Neuropharmacological activity of *Nigella sativa* L. extracts. *J Ethnopharmacol*, 88, 63–68.
7. Dandiya PC, Collumbine H. (1959). Studies on *Acorus calamus* (III): Some pharmacological action of the volatile oil. *J Pharmacol Exp Ther*, 125**,** 353-359.