WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 5.045
Volume 3, Issue 6, 1936-1944. Research Article ISSN 2277 – 7105

PHYTOCHEMICAL SCREENING AND NEUROPHARMA COLOGICAL STUDIES OF *CAPPARIS ZEYLANICA* ROOT BARK

Ramya Kuber Banoth* and Santhrani Thaakur

Department of Pharmacognosy and Pharmacology,Institute of Pharmaceutical Technology,Sri Padmavathi Mahila Visvavidyalayam, Tirupati, A.P.

Article Received on
25 June 2014,

Revised on 20 July 2014,
Accepted on 15 August 2014

***Correspondence for Author**
Dr.Ramya Kuber Banoth
Department of Pharmacognosy and Pharmacology,Institute of Pharmaceutical Technology, Sri Padmavathi Mahila Visvavidyalayam, Tirupati,A.P

ABSTRACT

The aim of the study was to evaluate neuropharmacological activities of the alcoholic extract of *Capparis zeylanica* (*CZ*). The alcoholic extract was given at a dose of 50, 100, 200 mg/kg. Spontaneous motor activity, analgesia, grip strength, alertness, immobility period in forced swimming test and tail suspension test were analyzed. The extract at given doses significantly dose dependently decreased exploratory activity, spontaneous motor activity and swimming, climbing behavior in forced swimming test and did not alter other parameters. The preliminary phytochemical analysis showed the presence of sterols, alkaloids, carbohydrates, saponins and flavonoids. The results of the present study indicated that the alcoholic extract may have active constituents with CNS depressant activity and at the given doses it is devoid of memory impairment and neurotoxicity.

KEY WORDS: *Capparis zeylanica*, neuropharmacological, CNS depressant, neurotoxicity, memory impairment, phytochemical.

INTRODUCTION

Capparis zeylanica(*CZ*) Linn (*Capparidaceae*) is a prostrate shrub found in plains between the Indus and Jhelum, inner valleys of the Himalyas, Chamba, Nepal, Sind, Andra Pradesh, Rajastan, Maharashtra and Konkan regions of India. and also in Afghanistan, North Africa and Australia. All parts of the plant are reported to relieve a variety of ailments. The root and bark of the plant is bitter and useful as tonic, expectorant, anthelmintic, emmenagogue, analgesic and also used in rheumatism, paralysis, toothache, enlarged Spleen [1]. In Unani Medicine, the decoction of the root bark is prescribed as a deobstruent to liver and spleen, as

an anthelmintic and anti-inflammatory agent [2]. The flower buds are pickled and sold as capers. Caper buds as well as the fruits are considered as useful in scurvy.The bruished leaves are used as a poultice in gout [3].Previous phytochemical investigations revealed the presence of E-octadec-en-ynoic acid and Flavonoids of Cleome and three *Capparis* species from the roots of *Capparis zeylanica* [4, 5]. Methanolic extract of *Capparis zeylanica* root is reported to have anthelmintic activity [6], antiinflamatory, analgesic [7,11] and antimicrobial activity [8]. Extracts of leaves posses analgesic, antipyretic (9), and immunostimulant effect [10].

MATERIALS AND METHODS

Collection and Extraction of *CZ* root Bark

The Plant material (roots) was collected from the wild sources in the month of September and identified by the Botanist Dr. Madhava cetty, Department of Botany, S.V. University, Tirupati, A.P. The roots were washed under running tap water, shade dried, the bark was peeled out and crushed to a coarse powder. The powder was passed through sieve no.40 and used for further studies. Dried coarse powder of *CZ* root bark was extracted with petroleum ether and then with alcohol. A light brown powdery extract was obtained after evaporation of solvent the yield was 8.1% w/w. A suspension of the extracts was prepared by using 2% w/v tween 80 in distilled water.

Animals

Male Swiss albino mice weighing 25-30g were used. They were housed in groups of five under standard laboratory conditions at temperature 23 ± 1^0C, relative humidity 55±5%. The animals had access to water and pellet diet ad libitum (Hindustan Lever Foods, Bangalore, India). The animals were deprived of food 12h before experimentation. Control group animals received 2% w/v tween 80 orally and all behavioural parameters were assessed one hour after the oral administration of extract.

Neuropharmacological Tests

Test for locomotor activity

The locomotor activity was measured by using Actophotometer (Inco, Ambala, India). It consists of cage which is 30 cm long and 30 cm deep. It has a wire mesh at the bottom, six lights and 6 photo cells placed in the outer periphery of the bottom in such a way that a single mice blocks only one beam. Photo cell is activated when the rays of light falls on photocells, the beam of light is cut as and when animals cross, number of cut off's were recorded for 10 minutes [12].

Hot Plate Test

The hot plate consisting of a electrically heated surface with a temperature of 55^{o} to 56^{o} C. The animals were placed on the hot plate and the time until either licking or jumping occur was recorded by a stop-watch. The latency was recorded before and after the oral administration of the test compound [13].

Forced Swimming Test (FST)

Mice were forced to swim individually in a glass jar (25 x 12 x 25 cm^{3}) containing fresh water of 15 cm height and maintained at 25^{o}C (± 3^{o}C). After an initial 2 min period of vigorous activity each animal assumed a typical immobile posture. A mouse was considered to be immobile when it remained floating in the water without struggling making only minimum movements of its limbs necessary to keep its head above water. The total duration of immobility was recorded during the next 4 min of a total 6 min test. The changes in immobility duration were studied after administering drugs in separate groups of animals [16].

Test for Alertness: Hole Board Test

This test was done using Hole Board. The hole Board consisted of a 0.5m^{3} wooden board with 16 holes (3cm in diameter). The mice was placed at the corner of the board and allowed to move freely. First two minutes were allowed for adaptation and the number of head dipping in next four minutes was counted [14].

Tail Suspension Test (TST)

The total duration of immobility induced by tail suspension was measured according to the method described by steru et al [19]. Mice were suspended on the edge of a table 50 cm above the floor by the adhesive tape placed approximately 1 cm from the tip of the tail. The total duration of immobility was recorded during the next 4 min of a total 6 min test [16].

Motor Co-ordination Test (Rota rod Test)

Motor Co-ordination test was conducted using a Rota rod apparatus (Inco Ambala, India). The animals were placed on the moving rod prior to the treatment and the mice that stayed on the rod without falling for 120 seconds was choosen for the study. The fall of time of animals before and after the extract was noted [13,15].

Phytochemical Analysis

Preliminary phytochemical analysis was carried out according to standard protocol [17,18].

Statistical Analysis

All values are expressed as Mean ± SEM. The data was analyzed using one way ANOVA followed by Dunnet's 'T' tests, in all test the criteria for statistical significance was $p<0.05$.

RESULTS

Results of the preliminary phytochemical analysis was carried out on the crude alcoholic extract of *Capparis zeylanica* indicated the presence of sterols, glylosides, saponins and flavonoids (Table 1).

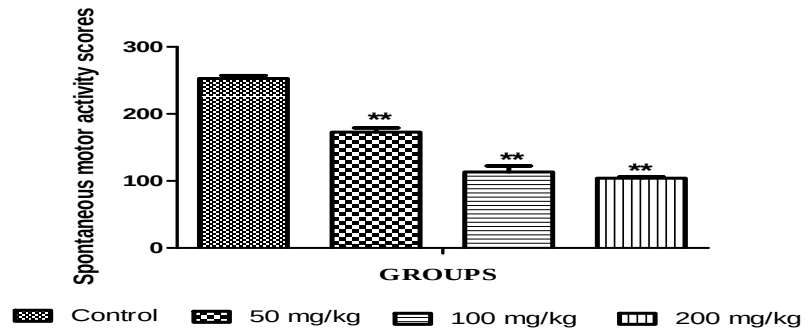
Table 1: Preliminary Phytochemical tests of alcoholic extract of *Capparis zeylanica* (*CZ*) root Bark

Name of the test	Alcoholic extract
Sterols	+Ve
Glycosides	+Ve
Saponins	+Ve
Carbohydrates	+Ve
Alkaloids	+Ve
Favonoids	+Ve
Tannins	-Ve

+ve- Postive Test; * -ve - Negative Test;

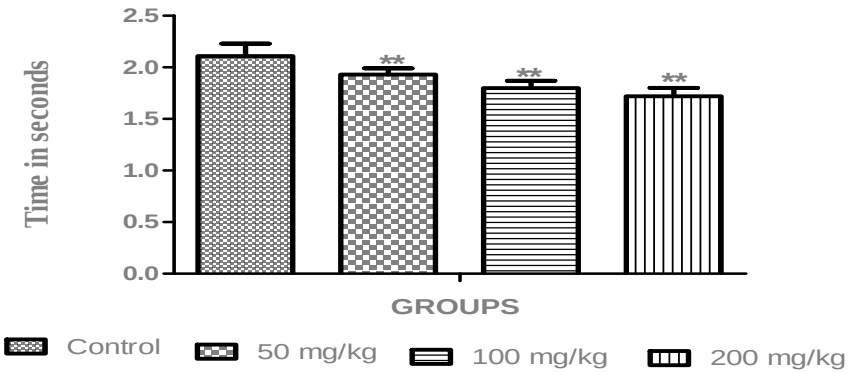
No lethal effect was observed in groups of mice during the 24 h period after oral administration at a dose of 50 to 200 mg/kg. The animals treated with 50, 100, 200 mg/kg showed significant ($P<0.01$) and dose dependent decrease in locomotor activity compared to control vehicle group (Fig.1). Alcoholic extract at a dose of 50, 100, 200 mg/kg showed no significant change in reaction time in comparison to control group (Fig.2) in Eddys hot plate test.

Fig.1 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Spontaneous motor activity scores



Values are expressed as Mean ± SEM of 8 animals, ** $P<0.01$ Vs Control Group

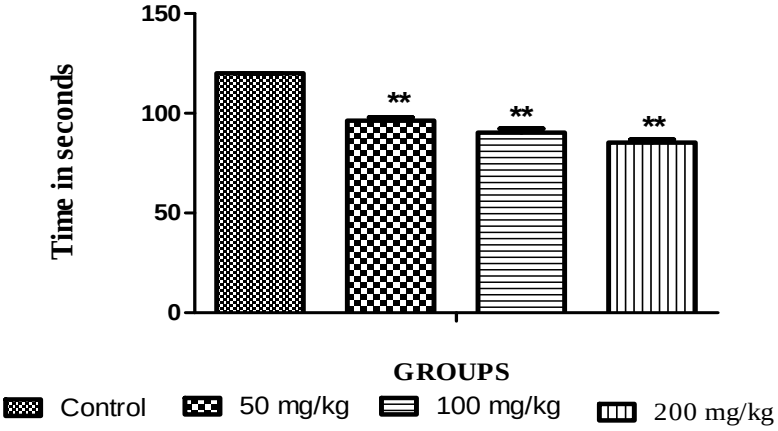
Fig.2 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Analgesia (Eddys hot plate test)



Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group

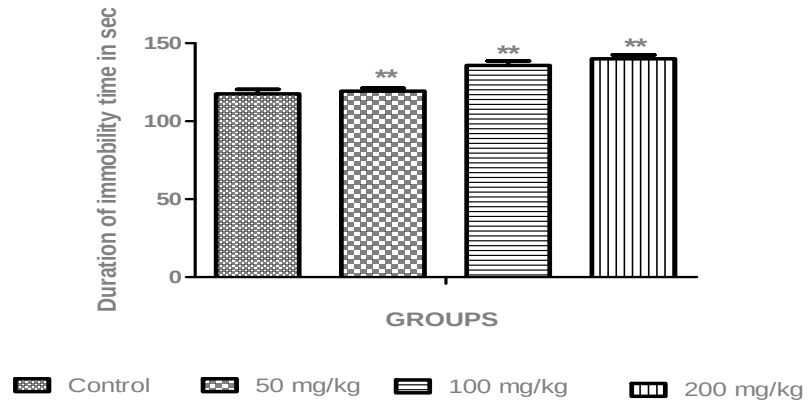
At given doses significant and dose dependent decrease was observed in the motor co-ordination (Fig.3).

Fig.3 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Motor co-ordination (Rota rod test)



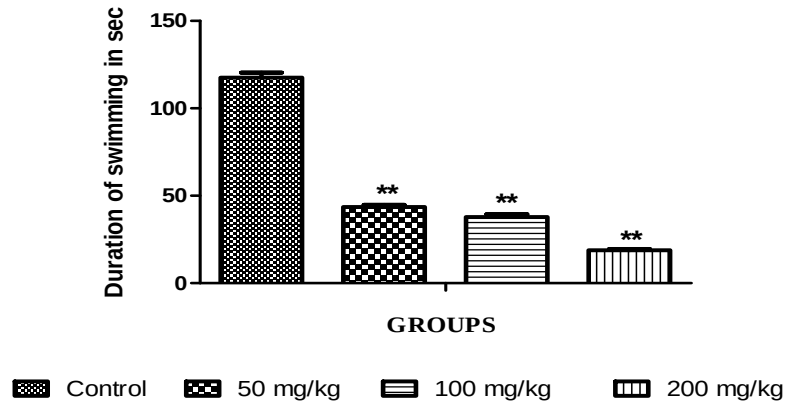
Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group The results of forced swimming test revealed that there was significant increase (p<0.01) in immobility and significant decrease (p<0.01) in swimming and climbing behaviour of animals at 50,100, 200 mg/kg in compared to control group (Fig. 4.5,6).

Fig.4 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Immobility time in Forced swimming test



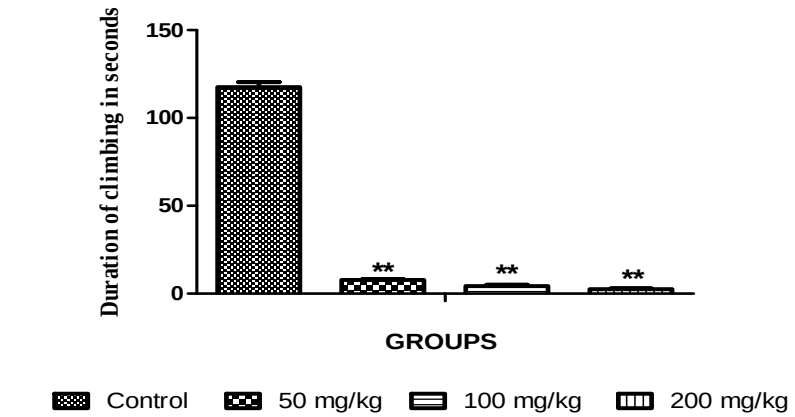
Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group

Fig.5 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Swimming time in Forced swimming test



Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group

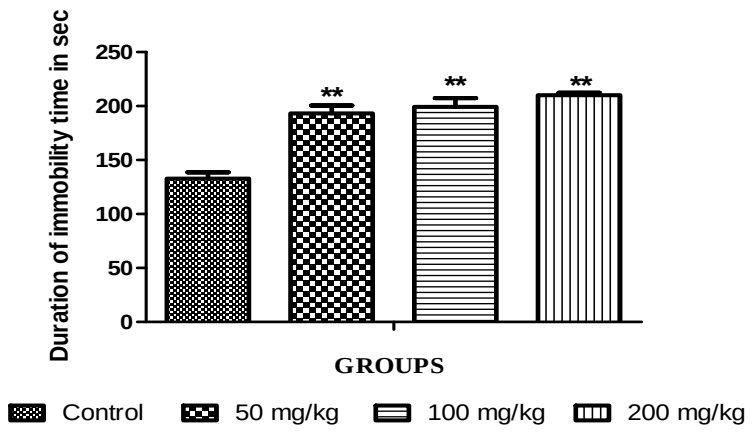
Fig.6 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Climbing time in Forced swimming test



Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group

Alcoholic extract of *Capparis zeylanica* exhibited significant and dose dependent increase in the immobility time in tail suspention test at all dose levels compared to control vehicle group in tail suspension test (Fig. 7).

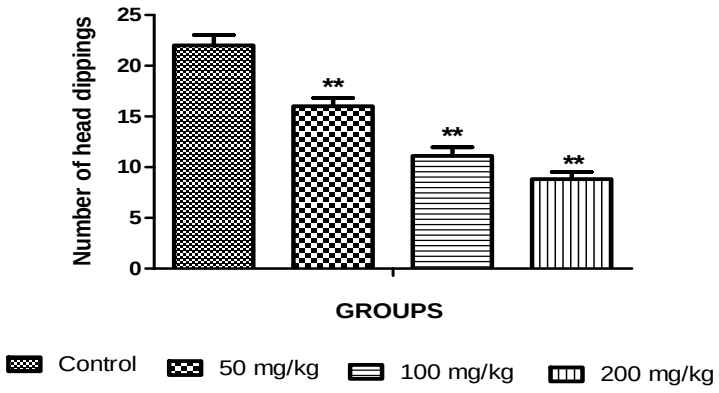
Fig.7 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Immobility time in Tail suspention test



Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group

The results of the hole board test are summarized in (Fig.8). A significant decrease in the number of head dipping was observed at all dose levels tested and followed a dose dependent decrease in comparison to control group.

Fig.8 Effect of alcoholic extract of root bark of *Capparis zeylanica* on Alertness (Hole board test)



Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group

DISCUSSION

In this study, alcoholic extract of *Capparis zeylanica* root bark was investigated for its effect on the central nervous system. The plant extract possessed CNS depressant activity as indicated by the significantly reduced alertness, motor co-ordination, spontaneous motor

activity, climbing and swimming in FST and increased immobility time in tail suspension test and forced swimming test. Decreased spontaneous motor activity could be attributed to the sedative effect of the extract [20]. The extract also reduced the time spent on the rotarod test, a test mainly used to screen centrally acting muscle relaxants [20]. The *CZ* extract may have muscle relaxant activity, which could be due to CNS depressant activity. Hole board test evaluates the effect of extract on alertness. Immobility period in Forced swimming test and Tail suspention test reflects a state of despair that can be reduced by several agents, which are therapeutically effective in human depression. Extract of *CZ* increased the immobility in FST and TST indicating CNS depressant effects.The root is used as analgesic but in hot plate test reaction time was not altered indicating that opioid mechanisms are not involved in the analgesic effect of *CZ*. The alcoholic extract may have active constituents with CNS depressant activity.

CONCLUSION

The preliminary pharmacological studies on the alcoholic extract of *Capparis zeylanica* root bark indicate that the root bark has active principles with CNS depressant activity. However, further pharmacological investigations are required to understand its underlying mode of action on the CNS. In addition, further bioactivity guided phytochemical work should be carried out to identify active constituents.

REFERENCES

1. Kirtikar KR, Basu BD. Indian Medicinal Plants. 1: (2nd ed). Bishen Singh Mahendrapal Singh. Dehradun : 1984, pp. 195.
2. Khare CP. Encyclopedia of Indian Medicinal Plants. Springer - Verlag Berlin. Heidelberg. New York: 2004, pp. 124.
3. Bhattacharjee SK. Hand Book of Medicinal Plants. Pointer Publication:1999, pp.68-69.
4. Haque ME, Haque M, Rahman MM, Khondkar P, Wahed MI, Mossadi KMA, Gray AI, Sarker SD. Isolation of E-octadec-7-en-ynoic acid from the roots of *Capparis zeylanica Linn*. Fitoterapia**,** 2004; 74 (2): 130-133.
5. Saraf MA, El-Ansari and Nabiel AMS . Flavonoids of four cleome and three *Capparis* species. Biochemical Systematic Ecology, 1997; 25 (2): 161-166
6. Ravindra GM, Shailaja M, Kalpana SP. Anthelmintic activity of Root bark of *Capparis zeylanica*. Indian. J. Nat. Prod, 2003; 121(4): 50-51.

7. Upaganlawar AB, Chopde VV, Ghule BV, Yeole PG. Analgesic effects of methanolic extracts of *Capparis zeylanica* roots. Phcog Mag, 2008; 4 (13): 90-94
8. Chopade VV, Tankar AN, Ganjiwale RO, Yeole PG. Antimicrobial activity of *Capparis zeylanica* roots. International Journal of Green Pharmacy, 2008; 2 (1): 28-30.
9. Ghule BV, Murugananthan G, Yeole PG. Analgesic and Antipyretic effects of *Capparis zeylanica* leaves. Fitoterapia, 2007; 78 (5): 365-369 .
10. Ghule BV, Murugananthan G, Nakhat PD, Yeole PG. Immunostimulant effect of *Capparis zeylanica* leaves, J. of Ethanopharmacology, 2 006;108 (2): 311-315.
11. Chaudary SR, Chavan MJ, Gaur RS. Antiinflammatory and Analgesic activity of *Capparis zeylanica* root extracts. Ind. J. Natural Products, 2004; 20 (1): 36-39.
12. Goyal RK. Practicals in pharmacology, 5th ed: B. S. Shah prakashan. Ahmedabad: 2006; pp 121-122.
13. Kulkarni SK. Hand book of Experimental Pharmacology. Vallabh Prakashan New Delhi, India: 1987; pp. 122.
14. File SE, Wardril AG. Validity of Head Dipping as a Measure of Exploration in a modified Hole-Board. Psychopharmacology, 1975; 44: 53-59.
15. Dunham NW, Miya TSJ. Am Pham. Assoc. Sci, 1957; 46: 208-209.
16. Bhattacharya SK, Satyan KS, Ramanthan M. Experimental methods for evaluation of Psychotropic agents in rodents. 11`Antidepressants. Indian J. Exp. Biol, 1999; 37: 120.
17. Kokate CK, Purohit AP, Gokhale SB. Text Book of Pharmacognosy, Nirali Prakasan. Pune, : 2002; pp 108-109.
18. Khandelwal KR. Practical Pharmacognosy. Nirali Prakashan, Pune:1998: pp. 171-172 .
19. Mohd Abid HJ, Harishikeshavan. M A. Pharmacological Evaluation of Pachyrrhizus Erosus(L) seeds for central nervous system depressant activity. Indian. J. Physiol Pharmacol, 2006; 50 (2): 143-151.
20. Rakotonirina VS, Bum EM, Rakotonirena A, Boplet M. Sedative Properties of the decoction of the rhizome of *Cyperus anticulatives*. Fitoterapia, 2001; 72: 22-29 .