ABSTRACT: Dichrostachys cinerea (DC) root juice is widely used by tribals of Chittoor District against paralysis. The ethanolic extract was given at a dose of 100, 200 and 400 mg/kg p.o. Spontaneous motor activity, analgesia, grip strength, alertness and immobility in tail suspension test (TST) and forced swimming test (FST) were assessed. The extract at given doses significantly dose dependently decreased exploratory activity, spontaneous motor activity, increased immobility time in both FST and TST, decreased climbing and swimming behaviour in FST and did not alter other parameters. Preliminary phytochemical analysis of ethanolic extract showed the presence of saponins, steroids, glycosides, carbohydrates and tannins.

Results of the present study indicated that the alcoholic extract may have active constituents with CNS depressant activity and at the given doses they are devoid of memory impairment and neurotoxicity.

KEYWORDS: Dichrostachys cinerea, neuropharmacological, CNS depressant, neurotoxicity, memory impairment.

Introduction

Dichrostachys cinerea (DC) belonging to Fabaceae family is commonly called “dunda” among the Hausa speaking people of northern Nigeria and “Kora” among the Yoruba speaking people of western Nigeria (Gill, 1992). The plant is a shrub, usually attaining a height of upto 5-10 m. The leaves are compound and pinnate. The inflorescence consisting of a penduculate spike, the flowers have two sets of colours pinkish white basally and yellow terminally (Mann et al., 2003). DC root is hot, bitter, wholesome. It improves the appetite, astringent to the bowels and used in the treatment of rheumatism, strangury, urinary calculi, renal troubles and diseases of the vagina. The young shoots are brushed and applied to the eyes in case of Ophthalmological disorders (Kiritkar and Basu, 1987). DC fruit have high phenolic and tannin contents and it also contains triterpenoids and other constituents (Joshi and Sharma, 1974). Ethanolic extract of roots, fruits, leaves and seeds of Dichrostachys cinerea was reported to have antibacterial activity (Bansu and Adeyemo, 2007; Elsa et al., 2008; Staden et al., 1993).

Materials and Methods

Collection and extraction of DC root

The plant material (roots) was collected from the wild sources in the month of Nov-Dec and identified by the Botanist in the Department of Botany, S.V.University, Tirupati, A.P. The roots were washed under running tap water, shade dried and crushed to a coarse powder. The powder was passed through sieve No.40 and preserved carefully for further studies. Dried coarse powder of DC root was extracted with petroleum ether and then with alcohol. A yellowish white colour extract was obtained after evaporation of solvent. The yield was 7.2% w/w. A suspension of the extract was prepared by using 2% v/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°C, relative humidity of 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% v/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 x 30 cm and has a wire mesh at the bottom, six lights and 6 photo cells are 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 crosses the light beam, number of cut off’s were recorded for 10 minutes (Goyal, 2005).
Hot Plate Test
The hot plate consisting of a electrically heated surface with a temperature of 55° to 56° C. The animals were placed on the hot plate and the time for either licking or jumping was recorded by a stop-watch. The latency was recorded before and after the oral administration of the test compound (Kulkarni, 1987).

Test for Alertness: Hole Board Test
This test was done using Hole Board. The Hole Board consisted of a 0.5m² 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 dippings in next four minutes was counted (File and Wardril, 1975).

Forced Swimming Test (FST)
Mice were forced to swim individually in a glass jar (25 x 12 x 25 cm³) containing fresh water of 15 cm height and maintained at 25°C (± 3°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 (Bhattacharya et al., 1990).

Tail Suspension Test (TST)
The total duration of immobility induced by tail suspension was measured according to the method described by st eru et al (Mohd Abid et al., 2006). 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. The changes in immobility duration were studied after administering drugs in separate groups of animals (Bhattacharya et al., 1990; Mohd Abid et al., 2006).

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 were choosen for the study. The fall of time of animals before and after the extract was noted (Kulkarni, 1987; Dunham and Miya, 1957).

Phytochemical Analysis
Preliminary phytochemical analysis was carried out according to standard protocol (Kokate et al., 2002; Khandelwal, 1998).

Statistical Analysis
All values are expressed as Mean ± SEM. The data was analysed using one way ANOVA followed by Dunnet’s ‘T’ tests, in all tests the criteria for statistical significance was p<0.05.

Results and Discussion
Results of the preliminary phytochemical analysis carried out on the crude alcoholic extract indicated the presence of glycosides, steroids, saponins, carbohydrates and tannins. Alcoholic extract of DC in dose of 1600 mg/kg did not cause any mortality in groups of mice during the 24 h period after oral administration. DC extracts at doses of 100, 200, 400 mg/kg produced significant (p<0.01) and dose dependent decrease in locomotor activity in comparison to control vehicle group (Fig.1).

Alcoholic extract at given doses (100, 200, 400 mg/kg) showed no significant (p<0.01) change in reaction time in comparison to control vehicle group in Eddys hot plate test (Fig. 2). Alcoholic extract at a dose of 100, 200, 400 mg/kg did not induce significant (p<0.01) and dose dependent motor in coordination (Fig. 3).

The results of forced swimming test exhibited that there was significant (p<0.01) increase in immobility and significant (p<0.01) decrease in swimming and climbing behaviour of animals treated at doses of 100, 200, 400 mg/kg in comparison to control groups (Fig. 4, 5, 6).

Results of Tail suspension test (Fig. 7) revealed that there was significant (p<0.01) and dose dependent increased in the immobility time at all dose levels treated groups in comparison to control vehicle group.

The results of the hole board test are summarized in Fig. 8. A significant (p<0.01) decrease in exploratory behaviour was observed at all dose levels and followed a dose dependent decrease in comparison to control vehicle group.
Fig. 1 Effect of Alcoholic extract of root of *Dichrostachys cinerea* on the spontaneous motor activity.

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

Fig. 2 Effect of alcoholic extract of root of *Dichrostachys cinerea* on analgesia (Eddy’s hot plate test)

Values are expressed as Mean ± SEM of 8 animals
Fig. 3  Effect of alcoholic extract of root of dichrostachys cinerea on motor co-ordination (rota rod test)

Fig. 4  Effect of alcoholic extract of root of dichrostachys cinerea on immobility time in forced swimming test.
Fig. 5 Effect of alcoholic extract of root of dichrostachys cinerea 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 of dichrostachys cinerea on climbing time in forced swimming test.

Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group
Fig. 7 Effect of alcoholic extract of root of dichrostachys cinera on immobility time in tail suspension test.

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

Fig. 8 Effect of alcoholic extract of root of dichrostachys cinera on alertness (hole board test)

Values are expressed as Mean ± SEM of 8 animals, ** P<0.01 Vs Control Group
The results of the present study indicates that the crude alcoholic extract of the DC root produced a significant decrease in spontaneous motor activity and alteration of general behaviour is a good index of CNS depressant activity (Salahdeen and Yemitan, 2006) which could be attributed to the sedative effect of the extract. Rotarod test revealed a significant loss of muscular coordination and the poor performance in the tail suspension test, this test is mainly used to screen centrally acting muscle relaxant (Rakotorina et al., 2001), which could be due to loss of muscular strength. Depressant drugs increases immobility time in FST and TST decreases swimming and climbing behaviour in FST, depending upon the concentration and type of depressant drugs administered (Poonia et al., 2006). CNS depressant action may be due to presence of phytochemical in the crude extract of DC.

The DC root extract possessed CNS depressant activity as indicated by the significantly reduced alertness, motor coordination, spontaneous motor activity, climbing and swimming in FST and increased immobility time in tail suspension test and forced swimming test indicated by CNS depressant effects.

**Conclusion**

The neuropharmacological investigations on the alcoholic extract of *Dichrostachys cinerea* root indicate that the root may have active principles with CNS depressant activity. Further work is required to identify the phytochemical responsible for the CNS depressant effect.

**References**


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