Research Article

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SCREENING OF BEHAVIOURAL AND ANTIDEPRESSANT ACTIVITY OF *OLDENLANDIA CORYMBOSA*

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ABSTRACT

The aim of present study was to evaluate the behavioural and antidepressant activities of *Oldenlandia corymbosa* extracts in mice. Behavioural study was evaluated by using Hole board apparatus while Antidepressant activity was tested by Forced swim test and by using Actophotometer. The chloroform and methanol extracts of *Oldenlandia corymbosa* were administered at 200 and 400 mg/kg. The result of the study shows that the extracts are effective in the treatment of behavioural and depression disorders. The chloroform extracts of *Oldenlandia corymbosa* show more significant activity over the methanol extract.

Keywords: *Oldenlandia corymbosa*, Antidepressant activity, Actophotometer, Forced swim test, Hole board test.

INTRODUCTION

Oldenlandia corymbosa syn. *Hedyotis corymbosa* (Rubiaceae) is a weedy annual, slender herb, found especially during monsoon. The plant is native to Africa and India, but also found throughout Malaysia[1,2]. In traditional medicine of Kerala, the plant is generally known as "Parppatakapullu". It is known to clear heat and toxins, activate blood circulation, promote diuresis and relieve stranguria. Chinese folk medicine describes the plant to treat skin sores, ulcers, sore throat, bronchitis, gynecologic infections and pelvic inflammatory diseases[3-6].It is given in jaundice, and other diseases of the liver, heat eruptions, vitiated conditions of pitta, hyperdypsia, giddiness, dyspepsia, flatulence, colic, constipation, helminthiasis, leprosy, skin diseases, cough, bronchitis, necrosis and nervous depression. The important preparations of the drug are Amritarishtam, Candanasavam, Mahatikta ghrtam, Jatyadi tailam, Aranyatulasyadi coconut oil etc[7].

Depression is a serious mood disorder that afflicts several millions of the world population[8]. WHO reports approximately 450 million of people suffer by mental or behavioural disorder[9]. Two-thirds of the anxious, depressed or psychotic patients react to the currently available treatments; but their clinical uses are limited by their side effects such as psychomotor injury, potentiation of other central depressant drugs and dependence liability. In the hunt for novel therapeutics for the management of neurological disorders, medicinal plant research has also contributed by demonstrating pharmacological effectiveness of different herbs in various animals models[10,11].

Herbal treatments are gaining emergent attention because of their cost- effective, eco- friendly features and true relief from illness. Various plants have a folklore claim in the dealing of some dreadful syndromes, but they are not scientifically exploited and/or incorrectly used[12]. Recently, the search for novel pharmacotherapy from medicinal plants for psychiatric illnesses has progressed significantly. Therefore, herbal therapies should be considered as alternative or complementary medicines[13].

In view of the fact that adequate scientific information is not available on behavioural and antidepressant activity of extracts of *Oldenlandia corymbosa*, we have carried out this work to authenticate the same.

MATERIAL AND METHODS

Collection and authentication of plant material

The plant of *Oldenlandia corymbosa* was collected in the month of September from the Botanical garden of M.S.U, Vadodara, Gujarat. The plant was authenticated by Taxonomist of the Botanical Survey of India, Jodhpur. A voucher specimen (No BSI/AZRC/I.1202/Tech./2012-13/721) was deposited in the Herbarium of Botanical Survey of India, Jodhpur.

Preparation of extracts and their phytochemical screening

The plants of *O. corymbosa* were washed thoroughly with water and air dried in shade at room temperature and then made into a coarse powder. The coarsely powdered material was subjected to successive solvent extraction in a Soxhlet apparatus using petroleum ether, chloroform, ethyl acetate and methanol. Water extract was prepared by maceration. After completion of extraction, the solvent was distilled off and the residue was concentrated and finally dried. The marc left after extraction with each solvent was dried completely in air before subjecting to next solvent. To detect the presence of various phytoconstituents, chemical tests were performed.

Animals

Swiss albino male mice weighing 25-30 g, were used for all sets of experiments in groups of six animals. They were maintained at controlled room temperature (25±2˚C) on 12-hour light/dark cycle and allowed free access to food and water. The experiments

were performed after the experimental protocol approved by the Institutional Animal Ethics Committee of Babaria Institute of Pharmacy and care of animals was taken as per CPCSEA guidelines.
Animals were divided in to control group, standard group and extracts treated group. Each group consists of 6 animals.

Ethical Committee Approval Number-BIP/IAEC/2015/04

Acute oral toxicity studies

2000 mg/kg of extract was administered as per OECD guidelines per orally to 6 mice. Effects were observed on behaviour for 72 hours. Mice were examined for behavioural effects 45 minutes post administration of the extracts. No change in behaviour or any abnormality in behaviour was observed and no mortality was seen. Thus, it was concluded that chloroform and methanol extracts of *Oldenlandia corymbosa* was nontoxic up to 2000 mg/kg doses. Then 1/5th and 1/10th of the administered dose was selected for future studies as per OECD guidelines[14].

Treatment

Animals were divided into six (I-VI) groups for the assessment of both the plant extracts. Group I was a negative control; Group II was positive control; Groups III to IV received chloroform extract of *O. corymbosa* at doses of 200 and 400 mg/kg p.o respectively. Group V to VI received methanol extract of *O. corymbosa* at doses of 200 and 400 mg/kg, p.o respectively.
Group II was positive control (FST & Actophotometer – Imipramine 15mg/kg, Head dip test – Diazepam 5mg/kg)

Antidepressant activity

Antidepressant activity was performed using forced swim test model and Actophotometer[15,16,17].

Forced Swimming Test

The apparatus consisted of an opaque Plexiglas cylinder (50 cm high × 20 cm wide) filled with water at room temperature, to a depth of 30 cm. During the 6 min swimming test, immobility behaviour was observed. Immobility is defined as when the animal made no further attempts to escape except for the movements necessary to keep its head above the water. Reduction in immobility is considered as a behavioural profile consistent with an antidepressant like action[15,16].

Actophotometer

The actophotometer was switched on and the animals were placed individually in the activity cage for 10 min. Standard, test and vehicle were injected in each animal of proposed groups and after 30 min. each animal was tested for 10 min. The locomotor activity after treatment was noted[17].

Behavioural Activity

Behavioural Activity was performed using Head dip test model.

Head dip test

Exploratory behaviour of mice in a novel environment was measured using a hole-board test (locally constructed). This method is used for measuring the response of the mouse to an unfamiliar environment. The apparatus consisted of a grey cardboard box (50×50×50 cm) with 18 equidistant holes 3 cm in diameter in the floor. 30 minutes after proposed treatment with standard/samples, head-dipping behaviours were checked for 20 minutes[17].

Statistical Analysis

Results are represented as Mean ± SEM. The test extract, standard and control were analyzed with the help of one-way analysis of variance (ANOVA) followed by Dunnett's Test. P values < 0.05 were considered as statistically significant.

RESULTS

Preliminary Phytochemical studies

The phytochemical screening of *Oldenlandia corymbosa* extracts showed the presence of various chemical constituents like terpenes, steroids, saponins, carbohydrates, phenolics and tannins.

Acute toxicity studies

The chloroform and methanol extracts of *Oldenlandia corymbosa* were well tolerated by mice after oral administration. There was no mortality in groups of animals and they did not show any toxicity or behavioural changes at a dose level of 2000 mg/kg. This finding proposes that the extracts were safe in or non-toxic to mice up to 2000 mg/kg. Hence, in our study 200 and 400 mg/kg doses of extract were selected.

Forced Swimming Test

The chloroform and methanol extracts of *O. corymbosa* (200 & 400 mg/kg) exerted increase in the immobility of mice when compared with control group. These increases were significant ($p<0.001$) at lower dose (200 mg/kg) of the extract (Figure 1).

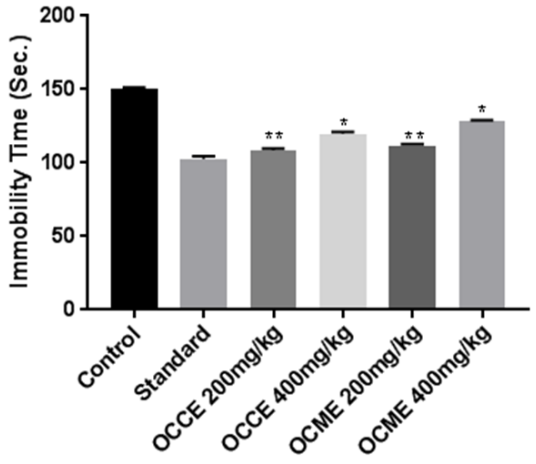

Figure 1: Effect of the chloroform and methanol extract of *O. corymbosa* on immobility time. Each bar represents the mean ± SEM (n = 6). One-way ANOVA followed by Dunnett's test, *P<0.05, **p<0.01 when compared with control group

Actophotometer

Monitoring of locomotor activity of animal has been an important step in assessing effects of drugs on the CNS. The movement is a measure of the level of excitability of the CNS and its decrease may be intimately related to sedation resulting from the

depression of the CNS. As shown in figure 2, the chloroform and methanol extracts of *O. corymbosa* (200 and 400 mg/kg, p.o.) produced a significant (P<0.05, P<0.01) and dose-dependent decrease in spontaneous motor activity. Decrease in the spontaneous motor activity leads to sedation as a result of reduced excitability of the central nervous system.

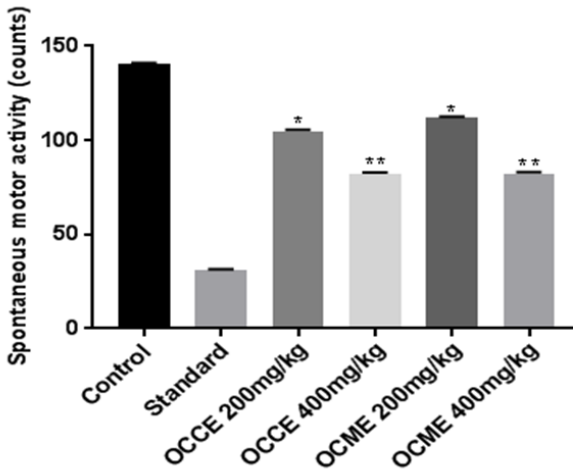

Figure 2: Effect of the chloroform and methanol extract of *O. corymbosa* on spontaneous locomotor activity. Each bar represents the mean ± SEM (n = 6). One-way ANOVA followed by Dunnett's test, *P<0.05, **p<0.01 when compared with control group

Head dip test

Hole-Board test is a measure of exploratory behaviour and an agent that decreases this behaviour reveals sedative activity. The result is shown in figure 3.

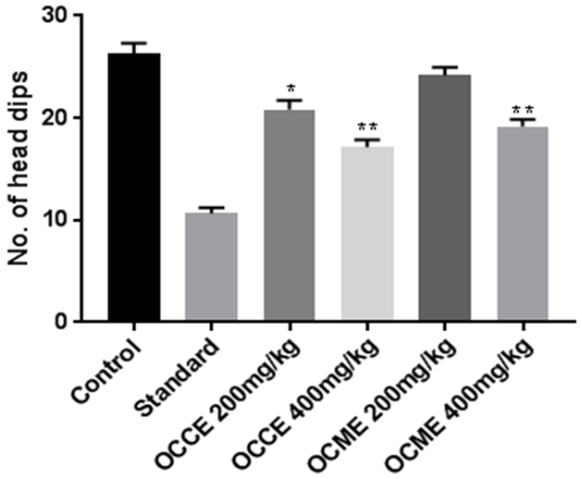

Figure 3: Effect of the chloroform and methanol extract of *O. corymbosa* on no. of head dips. Each bar represents the mean ± SEM (n = 6). One-way ANOVA followed by Dunnett's test, *P<0.05, **p<0.01 when compared with control group

The chloroform extract of *O. corymbosa* (200 and 400 mg/kg, p.o.) produced a significant (P<0.01) and dose-dependent reduction of exploratory behaviour in the hole board test. The methanol extract of *O. corymbosa* (400 mg/kg, p.o.) produced a significant (P<0.01) reduction of exploratory behaviour while methanol extract (200 mg/kg, p.o.) does not produced (P>0.05) any reduction of exploratory behaviour in the hole board test.

DISCUSSION

Preliminary phytochemical study indicated the presence of terpenes, steroids, saponins, carbohydrates, phenolics and tannins, which might be responsible for the behavioural and Antidepressant activity of extracts of *Oldenlandia corymbosa*.

In the present study, no mortality was observed up to the dose of 2000 mg/kg of *O. corymbosa* extracts (p.o.). Therefore, it may propose that the extract has no lethal toxicity in mice.

Antidepressant activity was evaluated by Forced Swim Test in which immobility time was noted. The exploratory behaviour was performed using hole board test apparatus and no. of head dipping was noted. The CNS inhibitory activity was done by using Actophotometer in which spontaneous motor activity count was noted. The extracts significantly decreased locomotor activity and increased immobility time suggesting depression and sedating potentials. Sedation may be due to interaction with benzodiazepines-like compounds.

CONCLUSION

The results of present study reveal that the extracts of *Oldenlandia corymbosa* showed significant behavioural and antidepressant activity. Further study is essential to find out the mechanism of action and identification and isolation of active constituent from the extracts of *Oldenlandia corymbosa* for the above stated activity.

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