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EVALUATION OF ANTI-DEPRESSION EFFECT OF KRISHNA MUSHALI (CURCULIGO ORCHIOIDES) IN MICE

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ABSTRACT

Back Ground: The depressive illness is one of the most common psychiatric disorder. Major depression represents a significant public health problem globally. The high prevalence of suicide among depressed patients (15%) coupled with complication arising from mental stress condition and its effects on the cardio-vascular system have suggested that it will be second leading cause of death by 2020. **Objective:** Present study was undertaken to evaluate the anti depressant activity of Curculigo orchiodes. (Krishna Musali.) in mice. **Materials and Methods:** The immobility time of control and treated mice were recorded in Tail suspension (TST) and Forced swim test (FST) models. The control group (10 ml of distilled water /kg, p.o), Fluoxetine (20 mg /kg bwt.p.o), extract of C.orchioides (200 mg and 300mg /kg. bwt, p.o respectively) were administered once a day for 10 days 1 hour prior to experiment. **Results:** It was observed that extract of c. orchioides produced significant antidepressant effect at a dose of 200mg and 300mg /kg as compared to control group as indicated by reduction in immobility time of mice in both FST and TST. **Conclusion:** It can be concluded from the present study that extract of c.orchioides has a significant antidepressant activity in animal models.

KEYWORDS: Antidepressant activity, Forced swim test, Tail suspension test.

INTRODUCTION

The depressive illness is one of the most common psychiatric problems in clinical practice nowadays. Impact of socio-economical condition plays a key role in genesis of such psychiatric problem throughout the world. Recently conducted World Mental Health Survey indicates that major depression is experienced by 10-15% of people in their lifetime[1] and about 5% suffer from major depression in any given year.[2] Lifetime prevalence of all depressive disorders taken together is over 20% i.e. one in five individuals. In Indian context, a recent large sample survey with rigorous methodology reported an overall prevalence of 15.9% for depression[3], which is similar to western figures. There is some suggestion that perhaps the prevalence of depression has increased over past few decades.[4] Studies done in primary health care setting in India have found depression in 21-84% of the cases.[5,6]

The high prevalence of suicide found in depressed patients (up to 15%) coupled with complications arising from stress and its effects on the cardio-vascular system, have suggested that it will be second leading cause of death by the year 2020 and it has been found that depression is a contributory factors for the fatal coronary disease.[7]

Several anti-depressant and mood stabilizer drugs have been introduced for the management of such clinical conditions. Current anti-depressant drugs claim to relieve the symptoms of depressive illness but the problem of tolerance and physical dependence on their prolonged use limits the clinical utility of such drugs. Therefore, there is a need for an effective herbal anti-depressant agent, which can replace such modern synthetic anti-depressant drugs in the management of depressive illness.

In different Ayurvedic classics, various drugs have been indicated for the management of different mental illnesses like anxiety, depression, and other mental conditions. Krishna Mushali (*Curculigo orchioides*), Vacha (*Acorus calamus*), Shankhapushpi (*Convolvulus pluricaulis*) and others are mentioned to treat the mental disorder. Among those, Krishna Mushali (*C. orchioides*) was chosen for the present study. and its easy available in the Gangetic planes in West Bengal. Krishna Mushali (*C. orchioides*) is one of the popular aphrodisiac drug advocated for improvement of mental and physical performance in Ayurved.

The present study was undertaken to evaluate the anti-depression effect of crude aqueous extract of C. orchioides root on certain psychological parameter in mice depression model.

The anti-depression effect of C. orchioides was compared to the widely used modern synthetic anti-depressant drug Fluoxetine.

MATERIALS AND METHODS

Plant material

The plant *C. orchioides* was collected from the local market in Kolkata. The raw plant drug was identified and authenticated by the expert of the department of Dravyaguna, Institute of Post Graduate Ayurvedic Education & Research at S.V.S.P Hospital, Kolkata.

Preparation of extract

The voucher specimen was deposited in the department. 200 g dry powder of *C. orchioides* was extracted with 2 lit of distilled water by cold maceration process for 72 h. Water extract was filtered and then was concentrated using vacume desicator. The yield was 7.5 g; it was collected and used for the pharmacological investigation of test drug. Weighed quantity of test extract was suspended in 1% of Gum acacia to prepare a suitable dose form.

Drugs and chemicals

The standard drug, Fluoxetine was purchased from the local medical store in Kolkata, India. Other chemicals and reagents are of analytical grade and were purchased from local market in Kolkata, India.

Animals

Swiss strain albino mice of either sex, weighing between 25 to 30 g, were procured from Indian Institute of Chemical Biology, Kolkata. The mice were kept in animal house colony cages in an ambient temperature of 25±2^{O}C with 12 hours light and dark cycle under controlled laboratory conditions. The mice were accessed with pellets and water *ad libitum*. The experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC) of I.P.G.A.E&R.

Experimental design

Total 24 mice of either sex were taken and assigned randomly in four groups of six mice each. Group A was served as control group and was treated by the distilled water (10m/kg,.p.o). Group B, animals were treated with Fluoxetine at the dose of 20 mg/kg body weight p.o., and were considered as a standard group. Group C was considered as test group and was treated with extract of C. orchioides at the dose of 200 mg/kg body weight p.o; and

Group D was considered as another test group and animals were treated with extract of C. orchioides at a dose of 300 mg/kg body weight p.o. The test drug was administered 1 h before the test procedure for 10 days. The standard drug was administered 30 min before the test procedure.

INDUCTION OF DEPRESSION

Forced Swim Test[11]

The Forced Swim Test was performed according to the method described by Porsolt et. al. Each mouse was forced to swim, placing individually in a 5 lit glass baker, filled to the height of 15-20 cm of water and the duration of immobility was recorded during the last 4 min of a 6 min test after an initial two minutes period of vigorous activity. A mouse was considered immobile when floating motionless or making only those movements, necessary to keep its head above the water surface.

Tail Suspension Test[12]

The tail suspension test was performed according to method mentioned by Steru et. al. Mice were suspended on the metal rod stand, 50 cm above the table top by the adhesive tape, placed approximately 1 cm from the tip of the tail. Immobility time was recorded during 8 min period. The immobility during the first 2 min due to vigorous activity was not taken into account and the remaining 6 min immobility was recorded.

Statistical Analysis

Data of the results were presented as mean ± standard error of mean (SEM). The statistical significance between the control, standard group and each of the test drug treated groups were done by student' s t test. $P<0.05$ was considered as the level of significance.

RESULTS

Effect of C. Orchioides on Forced Swim Test

The results of forced swim test are exhibited in Table 1. It was observed that the immobility time was significantly less in Group B in comparison to Group A ($P<0.001$), treated with Fluoxetine and Distilled water respectively. Immobility time was also significantly less ($P<0.05$) in Group C treated with water extract of *C. orchioides* at a dose of 200 mg/kg body weight in comparison to control group. When assessment was done in between Group A and Group D, it was observed that there was a highly significant ($P<0.005$) less immobile phase

in Group D in comparison to Group A. Immobile phase was significantly less (P<0.05) in Group D in comparison to Group B also.

Effect of C. Orchioides on Tail Suspension Test

The results of tail suspension test are revealed in Table 2. The immobile phase was highly significantly less (P<0.01) in Group B in comparison to Group A, treated with Fluoxetine and distilled water respectively. It was observed that immobility time was also significantly less (P<0.05) in Group C in comparison to Group A. A highly significant less (P<0.01) immobile phase was observed in Group D in comparison to control group. It was also observed that the immobile phase was less in Group D in comparison to reference control group (Group B).

Table 1: Effect of drugs in mice on Immobile phase in FST in various groups.

Group	Drug and dose	Immobile phase (Mean ± SEM)
Group A(n=6)	Distilled water	160.83 ± 10.67
Group B(n=6)	Fluoxetine (20 mg/kg)	121.33 ± 4.34**
Group C(n=6)	C. orchioides extract (200 mg/kg)	133.33 ± 5.57*
Group D(n=6)	C. orchioides extract (300 mg/kg)	118.33 ± 6.93**

n = 6 animals in each group; * P<0.05 and ** P<0.01 considered statistically significant and highly significant respectively.

Table 2: Effect of Drugs in mice on Immobile phase in TST in different groups.

Group	Drug and dose (mg/kg)	Immobile phase (Mean ± SEM)
Group A(n=6)	Distilled water	264.33 ± 7.36
Group B(n=6)	Fluoxetine (20 mg/kg)	198.33 ± 17.96**
Group C(n=6)	C. orchioides extract (200 mg/kg)	197.50 ± 23.07*
Group D(n=6)	C. orchioides extract (300 mg/kg)	182.83 ± 26.97**

n = 6 animals in each group; * P<0.05 and ** P<0.01 considered statistically significant and highly significant respectively.

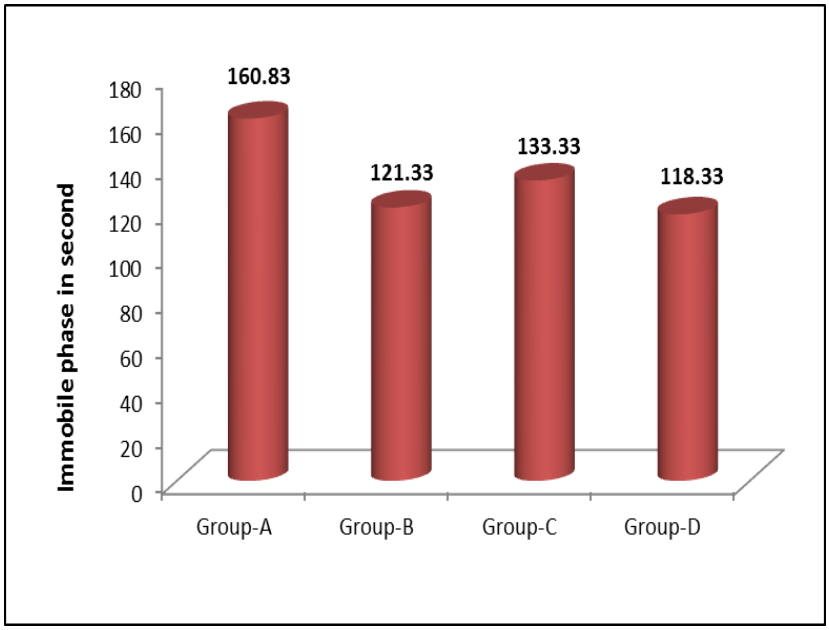

Figure 1: Showing Effect of drugs on Immobile phase in FST in various groups.

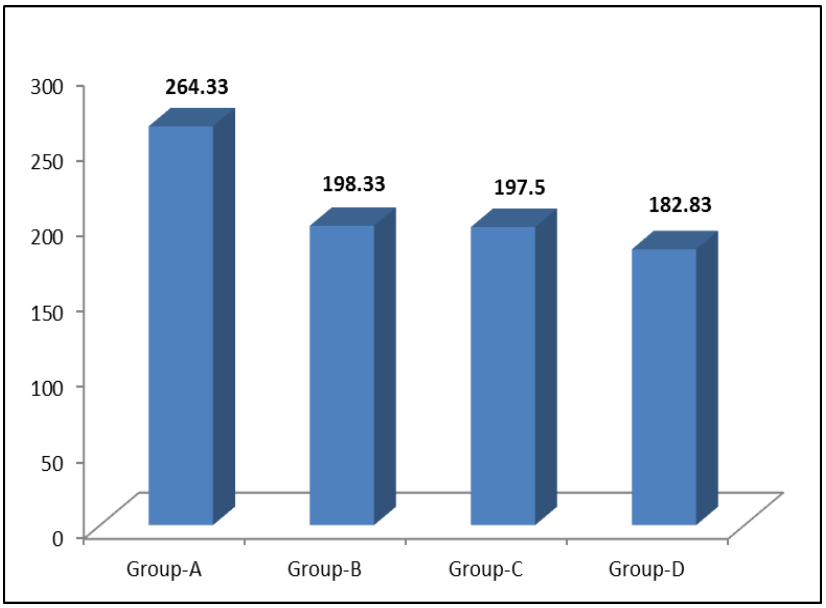

Figure 2: Showing effect of drugs i on Immobile phase in TST in different groups.

DISCUSSION

Major mood disorders are the most common mental illness with a lifetime risk of 10% of the general population. As many as 10-15% of the individuals with this disorder, and upto 25% of those of with bipolar disorders display suicidal behaviour during their lifetime. Current understanding of depression is based on a bio-psycho-social frame work, with an inter play of biological as well as psycho-social factors. Studies suggest that depressive disorders are heritable to some extend with 1.5-3 times increase the risk among those with a family history

of depression.[13] Few Indian studies have also found genetic factors to play a role in depression. Recently conducted world Mental health survey indicates that Major depression is experienced by 10-15% of people in this life time.[14] Studies done in primary health care setting in Indian have found depression in 21-84% of cases in Indian population.

Fluoxetine is used as reference standard drug in this study. It comes under Selective Serotonin Reuptake Inhibitors (SSRI) drugs. SSRI are common initial choice to treat depression in view of their easy to use and more tolerable side effects. Fluoxetine is the most economical and effective medication, which is usually preferred in an otherwise healthy adult with depressive illness.

FST and TST both are preliminary behaviour despair models which are widely used to evaluate antidepressant effect of drugs.[15] In the present study, *C. orchioides* produced significant anti-depressant like effect in mice in both FST and TST. Sometimes, the effects are comparable and even better than the standard drug, Fluoxitine. The test drug, aqueous extract of *C. orchioides* is more effective at higher dose level (300 mg/kg) than lower dose level (200 mg/kg).

The test drug, *C. orchioides* is mentioned in the Ayurvedic text as an aphrodisiac drug. Its aphrodisiac activity has been established by various studies.[8] It exhibits the antidepressant activity may be due to its aphrodisiac property. The plant is found to be safe as no mortality was reported following treatment with doses as high as 5000 mg/kg b.w. The drug *C. orchioides* also possesses immunomodulator and antioxidant activities.[9] One previous study reported that curculigoside present in the root extract of *C. orchioides* improves the cognitive function (learning and memory) in aged rats.[10] Another study reported that curculigoside, collected from the root extract of *C. orchioides* possesses significant anti-depressant like activity. It increases the level of dopamine, norepinephrine, 5-hydroxytryptamine (5HT) and upregulation of brain derived neurotrophic factor (BDNF) expression in brain.[16]

CONCLUSION

It may be inferred from the present study that aqueous extract of *C. orchioides* is an effective antidepressant drug. It is more effective at higher dose level (300 mg/kg) than lower dose (200 mg/kg) as antidepressant drug in mice. However, farther studies are required to elucidate the antidepressant effect *C. orchioides* on different neurotransmitter level in brain.

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