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ASSESSMENT OF ANTI-DEPRESSANT ACTIVITY OF A POLYHERBAL FORMULATION BC019

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ABSTRACT

In our present study, the anti-depressant effect of polyherbal formulation BC019 was assessed using two behavioral models, the forced swim test (FST) and tail suspension test (TST) in rats in *in-vivo*. In FST & TST, BC019 showed a dose dependant, statistically significant reduction in duration of immobility that was similar to imipramine (20mg/kg).The effect of 400mg/kg of BC019 was better than standard drug imipramine. The effect of 200mg/kg of BC019 was significant when compared to vehicle treated group. These results proved that the polyherbal formulation BC019 possessed anti-depressant activity in *in-vivo*.

KEYWORDS: Anti-depressant, Forced swim test, Tail suspension test, imipramine, rats, immobility.

INTRODUCTION

Depression is a state of mental illness. It is characterized by deep, long lasting feelings of sadness or despair. Depression can change an individual's thinking/feelings and also affects his/her social behavior and sense of physical well-being.[1]

Several classes of antidepressants are used to treat depressions but they have side effects such as blurred vision, restlessness, sexual problems agitation and suicidal thoughts. To reduce the impact of depression; there is an urge to provide a cost effective treatment to the public. With the increased incidence of depression recently, natural herbs that have antidepressant effect have again more attention as alternative treatment for depression. Herbal medicines are less toxic and less costly when compared to the synthetic drugs. According to practitioners of

traditional medicine, a combination of herbs exhibits augmented therapeutic efficacy than a single herb.

The polyherbal formulation BC019 contains: *Acorus calamus* and *Basella alba* had already been shown to exhibit antidepressant activity in experimental models in previous studies.[2,3] In the present study, an attempt has been made to investigate the antidepressant activity of a poly herbal formulation BC019 in treating depressed rats by employing Forced Swim Test (FST) and Tail Suspension Test (TST). The standard drug, Imipramine which was used as a positive control to compare the efficacy of a polyherbal formulation BC019 as an anti-depressant.

MATERIALS AND METHODS

Collection and Authentication

The plants *Acorus calamus* and *Basella alba* were collected from Guntur, Andhra Pradesh, India. The plants were identified and authenticated by Dr.P.Satya Narayana Raju, Plant Taxonomist, Department of Botany and Microbiology, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur, Andhra Pradesh, India.

Preparation of Polyherbal formulation BC019

The dried roots of *Acorus calamus* and leaves of *Basella alba* were washed and cleaned separately. The powdered plant materials were used for the preparation of methanolic extracts. 500 gms of each plant material was weighed and extracted with 95% methanol by maceration process separately for 4 days and filtered with whatman filter paper. The extracts were concentrated under reduced pressure and stored in vaccum dessicators for complete removal of solvent. Each extract was weighed and percentage yield was calculated.[4]

The polyherbal formulation which contains equal proportions of the methanolic extract of *Acorus calamus* (roots) and *Basella alba* (leaves) was called as **BC019**.

Qualitative Phytochemical Analysis

Phytochemical analysis of Polyherbal formulation BC019 was carried out by using standard procedures to identify the presence of various phytoconstituents.[5]

IN-VIVO STUDIES

Experimental Animals

Adult wistar albino rats (150-180 g) of either sex were procured from the laboratory animal house, Hindu College of Pharmacy, Guntur, Andhra Pradesh, India and used in the study. The animals were kept under standard environmental conditions of room temperature (22± 2°C), relative humidity (50% ± 5%) and 12 h light and dark cycle. The animals were housed in the colony cages (three rats per cage) and provided feed (commercial pellets contain a balanced ration obtained from Mahaveera Enterprises, Hyderabad) and water *ad libitum*.

All the animals were acclimatized to the laboratory environment 5 days prior to experiment. The animals were fasted overnight just prior to the experiment but allowed free access to drinking water. All the experiments were carried out in accordance with the guidelines of Institutional Animal Ethics Committee.

The study was conducted after obtaining ethical committee clearance from the Institutional Animal Ethics Committee No: HCOP/IAEC/PR-4/2019.

Antidepressant activity

1. Forced swim test

In this model wistar rats were divided into 4 groups of six animals each. The test apparatus consist of a transparent rectangular glass jar (25X12X25cm^3) filled to 15 cm depth with water (24± 1^0 C). In the pre-test session every animal was placed individually into the jar for 15mins, 24 hrs prior to the 6 minutes swimming test, in which the duration of immobility was recorded for the last 4 mins. Single administrations (p.o) of all the test agents were given prior to swimming test session. 1st group received only saline treatment, the 2nd group received Imipramine (20mg/kg p.o), 3rd group received poly herbal formulation-BC019 (200mg/kg; p.o), 4th group received poly herbal formulation (400 mg/kg; p.o) respectively. The period between when the rat was immersed and when no further attempts to escape were made (apart from the movements necessary to keep its head above the water) and were recorded as the immobility time.[6,7]

Group I : Control (Normal saline 10ml/kg; p.o)

Group II : Imipramine (20 mg/ kg; p.o)

Group III : Polyherbal formulation BC019 (200mg/kg; p.o)

Group IV : Polyherbal formulation BC019 (400mg/kg; p.o)

Statistical analysis

Results were analyzed by one-way ANOVA followed by Dunnett's multiple comparison test and the values P< 0.05 were considered significant (Table 1).

Table 1: Effect of polyherbal formulation (BC019) on immobility time in Forced swim test.

Group	Treatment	Dose (mg/kg)., p.o	Duration of Immobility(sec)
1	Control (Normal saline)	10ml/kg	155±6.77
2	Imipramine	20	101±3.38*
3	BC019	200	141.3±5.02*
4	BC019	400	109.3±1.96**

All values are mean ± SEM. (n=6).One-way ANOVA followed by Dunnet's test.*P< 0.05,** P<0.01 when compared to vehicle treated (control) animals.

2. Tail Suspension Method

Wistar rats were divided into 4 groups of six animals each. Here, the rats were individually suspended 50 cm above the surface of table with an adhesive tape placed 1 cm away from the tip of the tail. Immobility duration was recorded for the last 5 minutes during 6 minutes. Rats were considered immobile only when they hung passively and were completely motionless. Single administrations (p.o) of all the test agents i.e. vehicle, Imipramine (20mg/kg p.o) and poly herbal formulation BC019 (200, 400mg/kg) were given one hour prior to test.[8]

Group I : Control (Normal saline 10ml/kg; p.o)

Group II : Imipramine (20mg/kg; p.o)

Group III : Polyherbal formulation BC019 (200mg/kg;p.o)

Group IV : Polyherbal formulation BC019 (400mg/kg; p.o)

Statistical analysis

Results were analyzed by one-way ANOVA followed by Dunnett's multiple comparison test and the values P< 0.05 were considered significant (Table 2).

Table 5: Effect of polyherbal formulation (BC019) on immobility time in Tail suspension test.

Group	Treatment	Dose (mg/kg)., p.o	Duration of Immobility(sec)
1	Control (Normal saline)	10ml/kg	140±4.14
2	Imipramine	20	98±1.46*
3	BC019	200	130±2.09*
4	BC019	400	100±2.33**

All values are mean ± SEM. (n=6).One-way ANOVA followed by Dunnet's test.*P< 0.05,** P<0.01 when compared to vehicle treated (control) animals.

RESULTS AND DISCUSSION

The air dried and finely ground plant parts of *Acorus calamus* (roots) and *Basella alba* (leaves) was extracted by maceration process with 95% methanol for 4 days, when filtered and concentrated under reduced pressure gave the yield of 12% w/w and 8% w/w respectively. This was kept in dark place at 4^{o}c until tested. Hence forth, the polyherbal formulation which contains equal proportions of the methanolic extract of *Acorus calamus* (roots) and *Basella alba* (leaves) will be called as BC019.

Preliminary phytochemical analysis revealed the presence of carbohydrates, alkaloids, tannins, phenolic compounds, volatile oils, flavonoids and glycosides in BC019.

In this study, we used two animal models, FST and TST. Both the paradigms are widely accepted behavioral models for assessing pharmacological antidepressant activity. Characteristic behavior scored in these tests is termed immobility, reflecting behavioral despair as seen in human depression. In addition, it is well known that many antidepressant drugs are able to reduce the immobility time in rodents. The polyherbal formulation BC019 produced a marked reduction in immobility time at doses of 200 and 400 mg/kg in the rats FST and TST when compared to control. Also, BC019 at 400mg/kg had a similar effect to that observed for the standard drug imipramine.

The most prevalent theory for the pathogenesis of depression is "Monoamine Hypothesis". Functional deficiency of central monoamines such as noradrenaline, 5-hydroxytryptamine and dopamine are responsible for the symptoms of depression. Many currently used antidepressants act by increasing the concentration of these neurotransmitters in the brain. Therefore, the Antidepressant-like activity of BC019 might be due its modulatory effect on central monoamines.

CONCLUSION

From the results of our studies, it can be concluded that Polyherbal formulation BC019 exhibited significant anti-depressant activity. The observed effects are nearly equal to the existed familiar standard drug imipramine. However, further studies are necessary to find the exact mechanism of anti-depressant effect.

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