Research Article

A.Purna chander et al. /BioMedRx 2013,1(2),122-124

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Anxiolytic and antidepressant activity of *Barleria buxifolia* Linn

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Received on:05-11-2012; Revised on: 09-12-2012; Accepted on:19-01-2013

ABSTRACT

Anxiety and Depression are overwhelming mood disorders which account for 15% of the world population.With the drawback of existing treatment the researchers has focused on plant extracts which are having no side effects.*Barleria buxifolia* (From the family Acanthaceae) is traditionally used in bronchitis and inflammation.The aim of the present study was to investigate the anxiolytic and andepressant activities.An aqueous extract of dried leaves of *Barleria buxifolia(AqEOBB)* was prepared.The anxiolytic and antidepressant of this aqueous extract has been evaluated by Elevated Plus Maze[EPM] model and Forced Swim Test[FST].The aqueous extract of *Barleria buxifolia* has shown effect in dose dependent manner.In EPM model the dose of 200mg/kg has shown significant [$p<0.01$] effect by increasing the number of entries and time spent in open arms when compared to control group indicating anxiolytic activity and in FST by decreasing the duration of immobity.*Barleria buxifolia* could be the alternative in treatment but further studies are required to evaluate the mechanism by which the anxiolytic and anti-depression activities are shown.

Key words: *Barleria buxifolia*,Elevated Pus Maze,Forced Swim Test.

INTRODUCTION

According to the World Health report[1]approximately 450 million people suffer from mental or behavioral disorder,yet only a small minority of them receives even the most basic treatment.This amounts to 12.3 % of the global burden disease ,and will rise to 15% by 2020[2].In the search for new therapeutic products for the treatment of neurological disorders ,medicinal plant research,worldwide has progressed constantly demonstrating the pharmacological effectiveness of different plant species in a variety of animal models[3]. Depression is the most prevalent mental disorder and depression is recognized to be symptomatically,psychologically and biologically heterogenous[4-6].The complexity of daily life in modern society frequently leads to a varying degree of anxiety and depression. Patients in Current treatment option for depressed patients mainly include amine uptake inhibitors and mono amine oxidase inhibitors[7]. Although the later is less frequently used[8-9].Benzodiazepines remain prominent as drugs of choice for acute anxiety states but are being slowly replaced by antidepressants which are not only efficacious in depression but also in the acute and long term treatment of several anxiety disorder[10-11]. Mood, depression and anxiety disorders have been found to be associated with chronic pain among medical in both developed and developing countries[12-13].These considerations implicate the search of new antidepressant agents with less side effects and wider safety margin.This lead the scientists to search for plant based medicines for treatment of various mood related disorders.

Barleria buxifolia Linn belonging to family Acanthaceae is an erect under shrub with long spines and white to pink flower and used as an ornamental hedge in garden.The roots and leaves were used traditionally in cough,bronchitis inflammation(applied to swellings)[14]. The Phytochemical constituents like barleriquinone, anthraquinone [15]. A review of literature revealed there has no significant work has been carried out on the antidepressant activity of the plant extracts.So the present study was designed to evaluate the anti-anxiety and antidepressant activity of aqueous extract of *Barleria buxifolia*.Linn.

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MATERIALS AND METHODS

Plant material:

The leaves of *Barleria buxifolia* were procured from the forests and it was authenticated by botany professor of Osmania university.

Preparation of Extracts:

Leaves of *Barleria buxifolia* were dried in shade and coarsely powdered. The powdered leaves were subjected to soxhlet extraction by water used as solvent for 72h.The extract was concentrated by distilling off the solvent and then evoparating to dryness on the water bath.

Test animals:

The experimental animals (Sprague Dawley rats [180-220gm] of either sex) were procured from the animal house of Vishnu institute of phar-

maceutical education and research.The animals were given standard laboratory feed and water *ad libitum*.All the experimental procedures and protocols used in the study were reviewed by the Institutional Animal Ethics Committee(1358/ac/10/CPCSEA).

ACUTE TOXICITY TEST:
Acute oral toxicity study was per formed as per Organization for Economic Cooperation and Development (OECD) guidelines 423[16].After the oral administration of AqEoBB, animals were observed individually atleast once during the first 30 minutes and periodically during the first 24 hours, with special attention given during the first 4 hours and daily thereafter, for total of 14 days.

Anti-anxiety activity

Elevated plus maze model:
The elevated plus maze model is well established model for testing anxiolytic drugs[17].The elevated plus-maze apparatus consists of two open arms (16 x 5 cm for mice and 50 x 10 cm for rats),two closed arms (16x 5x 12 x cm for mice and 50 x 10 x 40 cm for rats), and an open roof with the entire maze elevated (25 cm for mice and 50 cm for rats) from the floor .The animals were placed individually in the centre of the maze ,head facing towards open arms and the stop watch was started and following parameters were noted for 5 min.a) First preference of mice to open and closed arm.b) Number of entries in open and closed arms(an arm entry defined as the entry of four paws into the arm). c) Average time each animal spends in each arm (average time= total duration in the arm/ number of entries).

Treatments
Animals were divided into four (I-IV) groups .Group I was a nagetive control and was given vehicle,consisting of simple syrup IP and carboxy methyl cellulose (2%),in a dose of 0.25 ml.Group II was a positive control and was given standard drug diazepam (2 mg/kg orally),suspended in the vehicle.Group III –IV were treated as test groups and were given with different doses of leaf extract 100 and 200 mg/kg orally respectively.

Anti-depressant activity

Forced swimming test
The FST is the most widely used pharmacological in vivo model for assessing antidepressant activity[18].The swimming test includes two exposures to a water tank spaced 1 day apart. For these experiments, the tank sizes were 22 cm in diameter and 40 cm in height.The tank had a rounded lid and contained 20-cm- high fresh water at 25 °c .During the first exposure ,rat not yet treated were placed in the tank and left there for 15 min.During the second exposure(test session) 30 min after the treatment rat were placed in the tank and left there for 5 min during which their immobility time was observed.A rat was considered immobile when it remained floating in the water ,without struggling making only very slight movements necessary to keep its head above the water.

Treatments
Animals were divided into four (I-IV) groups .Group I was a nagetive control and was given vehicle consisting of simple syrup IP and carboxy methyl cellulose (2%),in a dose of 0.25 ml.Group II was a positive control and was given standard drug Imipramine(20 mg/kg orally),suspended in the vehicle.Group III –IV were treated as test groups and were given with different doses of leaf extract 100 and 200 mg/kg orally.Respectively.All the test solutions,standard drug and control were administered orally 30 minutes prior to experiment.

STATISTICAL ANALYSIS
All the data represent mean ± S.E.M. values.The data were analyzed by means of analysis of variance(ANOVA).Whenever ANOVA was significant further multiple comparisions were made using Dunnets t-test as the post hoc test.

RESULTS

Acute Toxicity Study:
From the acute toxicity studies no toxicity was found at the doses 2g/kg and 5 g/kg and the doses were selected for study were 100 and 200 mg/kg.

Effect of AqEoBB On Elevated Plus Maze Test :
The oral administration of aqueous extract of *Barleria buxifolia* at the dose of 100 and 200 mg/kg has shown significant($p<0.01$) results when compared to control and the diazepam at the dose of 2 mg/kg also shown the significant effect Table 1.

Effect of AqEoBB On Forced swim test: The result obtained from the FST, indicated that aqueous extract showed significant ($p<0.01$) anti depression activity as compared to imipramine .Aqueous extract at the dose of 200 mg/kg showed a significant decrease in the time spent immobile by rat from 182 ± 6.16 sec in control to 136 ± 5.83 sec. Results obtained are presented in Table 2.

Table 1: Anti-anxiety activity of aqueous extract of leaves of *Barleria buxifolia* Linn

Group	Dose (mg/kg)	No.of Entries	Tine spent in open arm for 5min(Sec)	Tine spent in closed arm for 5min(Sec)
Control		2.00 ± 0.7	7.20 ± 1.30	292.80 ± 1.30
Diazepam	2mg/kg	5.60 ±1.14***	175.20 ± 4.54***	124.80.00 ± 4.54***
AqEoBB	100mg/kg	2.60 ± 1.14*	95.00 ± 6.08**	205.00 ± 6.08**
AqEoBB	200mg/kg	4.00 ± 1.22*	101.40 ± 5.03**	198.60 ± 5.03**

*Values are mean ± SD,n = 6 in each group,*P < 0.05,**P<0.01 and***P<0.001 when compared with vehicle treated group(Dunnet's test) .*

Table 2: Anti-depression activity of aqueous extract of leaves of *Barleria buxifolia* Linn

Group	Dose	Duration of Immobility (Sec)
Control		182.0 ± 6.2
Imipramine	20mg/kg	14.2± 1.5***
AqEoBB	100mg/kg	148.2 ± 7.9**
AqEoBB	200mg/kg	136.5 ± 5.8**

*Values are mean ± SD,n = 6 in each group,**P<0.01 and ***P<0.001 when compared with vehicle treated group(Dunnet's test) .*

DISCUSSION AND CONCLUSION

Elevated plus maze is a model which uses the natural fear of rodents to avoid open and elevated places[19]. The conventional plus maze is highly sensitive to the influence of both anxiolytic and anxiogenic drugs acting at the GABA- benzodiazepine complex[20]. In this model, naive mice will normally prefer to spend much of their allotted time in the closed arms.This preference appears to reflect an aversion toward open arms that is generated by the fears of the open spaces. Drugs that increase open arm exploration are considered as anxiolytics and the reverse holds true for anxiogenics. As expected, diazepam produced significant increase in time spent in open arm and non-significantly increased number of entries from closed to open arm and latency of first entry. Pre-treatment with *Barleria buxifolia* also significantly increased number of entries from closed to open arm and latency of first entry and non-significantly increased in time spent in open arm. Thus the mechanism involved in observed anti-anxiety activity may be similar to that of diazepam.

The forced swimming test is the most widely used tool for assessing antidepressant activity preclinically[21].The wide spread use of this model is mainly due to its ability to detect various antidepressant agents.The test is based on the observation that rodents (rats and mice) ,following initial escape oriented movements develop an immobile posture when placed inside an inescapable cylinder with water .The immobility is thought to reflect either a failure of persistence in escape –directed behavior meaning the loss of the animals ability to cope with stressful stimuli[22].

In conclusion the aqueous extract leaf of *Barleria buxifolia* produces significant anxiolytic and antidepressant activity.However further study is needed to evaluate the exact mechanism by which the extract produces these effects.

ACKNOWLEDGEMENTS:

The authors are thankful to Vishnu institute of Pharmaceutical education and research for providing necessary facilities for successful completion of the work.

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Source of support: Nil, Conflict of interest: None Declared