International Journal for Pharmaceutical Research Scholars (IJPRS)

V-5, I-4, 2016 ISSN No: 2277 - 7873

RESEARCH ARTICLE

Evaluation of Antidepressant Activity on Extract of *Piper betle* leaves- A Research

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Manuscript No: IJPRS/V5/I4/00148, Received On: 01/11/2016, Accepted On: 12/11/2016

ABSTRACT

Piper betle is traditionally recommended for Antimicrobial activity, gastro protective activity, Antioxidant activity, radio protective activity, antidiabetic activity. Our study aimed to characterize the effect of methanol (80%) extract of on Wistar rat's neurobehavioral models. The findings suggest that if possesses potential antidepressant and anxiolytic activity.

KEYWORDS

Piper Betel, Antidepressant, Methanolic Extract, Tail Suspension Test, Forced Swim Test, Wistar Rat

INTRODUCTION

Piper betle L. (Piperaceae) is evergreen and perennial plant has the shape of his own heart and is commonly known as Betel leaf[1]. It is tropically Asian vine closely related to the common pepper[2]. The Betel leaf itself has a spicy taste and yields an essential oil widely used as a medicine. Their different solvent extract of betel leaves possess antioxidant antimicrobial and anti-inflammatory effect[3-5]. It is noted that a solvent system for extraction such as preparation for analysis, the nature of interested component, and the physiochemical properties of matrix.

The traditional use of Betel leaf has been described from ancient time as an aromatic stimulo- carminative, as astringent and aphrodisiac. The biological activity of betel as antimicrobial activity, gastro protective activity, antioxidant activity, antidiabetic activity[6], radio protective activity[7]. Effect on the cardiovascular system/Platelet inhibition activity. The specific strong pungent aromatic flavor in leaves is due to phenol and terpene like bodies[8].

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Piper betle is isolated from methanol 80% involves (yield 405gm) reported for its Antidepressant activity and Anxiolytic activity.

MATERIAL AND METHODS

Authentication

The whole plant was collected during the month of june-2015 from MOHOBA. It was authenticated by taxonomist Dr. Priyanka Agnihotri from National Botanical Research Institute, Lucknow. A specimen copy of authentication number 101203 was deposited in the department herbarium.

Preparation of Extract

5gm of sundried powdered Piper betle leaves were soaked in 50 ml of 70% ethanol or 80% methanol.

Kept in dark for 4 days so that secondary metabolites get dissolved. It was filtered in weighted in petriplates by the help of Whatman's filter paper no-1.

After filtrate collected in weighted petridish was kept in oven at 50^0C so that methanol and ethanol get evaporated. Thus giving the final concentration of the extracted metabolites 500mg/ml.

Drug Treatment

Depression and mania are affective (emotional) disorder in which there is pathological change in mood state. Antidepressant drugs are classified into three groups. They are Monoamine oxidase inhibitor (M.A.O. INHIBITOR), Tricyclic antidepressant and atypical antidepressants. (Second generation antidepressant)

Drugs and Chemicals

The drugs and chemicals were used and all reagents and chemicals used were of analytical grade.

- Imipramine (Torrent Pharma, India) (15 mg/kg p.o.) were used as the standard antidepressant agent.
- Diazepam (Ranbaxy, India) (1mg/kg i.p. and 3mg/kg p.o.) was used as the standard anxiolytic agent.
- Indomethacin (Ranbaxy, India) (5mg/kg, p.o.) was used as standard anti-inflammatory agent.
- Pentylenetetrazole (Ranbaxy, India) (80 mg/kg i.p.) was used as convulsion producing agents)
- Phenbarbiton (Sigma, St. Louis USA) (60 mg/kg p.o) was used as standard anticonvulsant drug.
- Pentobarbitone (40 mg/kg i.p.) was used as sleep inducing agent.
- Pentazocine (Ranbaxy, India) (10mg/kg i.p.) was used as standard analgesic agent.

Animals

Adult charls foster wistar rats (150±20 g) and albino mice (25±5g) of either sex and randomly distributed into different experimental groups. The rats were housed in groups of six in polypropylene cages at an ambient temperature 25^{o}C±1^{o}C and 45-55% R_h with a 12:12 hour's light/dark cycle. Animal were provided with commercial food pellet and water ad libitum unless stated otherwise Experiment were conducted between 09:00 and 14:00hr. Animals were acclimatized for at least once one week before using them for experiment.

Behavioral Tests

Tail Suspension Test (TST)

Tail suspension test commonly employed behavioral model for screening antidepressant like activity in mice.[9] Animals were moved from their housing colony to laboratory to their own cages and allow to adapt to the laboratory condition for 1-2 hours. Each mouse was individually suspended to the edges of the table, 50 cm above the floor, by adhesive tape placed approximately 1 cm of the tip of the tail. Each animal under test was both acoustically and visually isolated from other animals during the test. The total period of an immobility was recorded manually for 6 min. Animal was considered to the immobile when it didn't show any body movement, hung passively and completely motionless. The test was conducted in a dim lighted room and each mouse was used only one in test. The observer, recording the immobility of animals, was blind to the drug treatments given to the animals under study.

Forced Swimming Test (FST)

Forced swim test the most frequently used behavioral model for screening antidepressant like activity in rodents.[10] The procedure was same as followed previously. Mice were individually forced to swim in open glass chamber (25*15*25 cm) containing fresh water to a height of water; animals were not able to support themselves by touching the bottom or the side walls of the chamber with their hind-paws or tail. Water in the chamber was changed after subjecting each animal of FST because "used water" has been shown to alter the behavior. Each animal show vigorous moment during initial 2 min. period of the test. The duration of immobility was manually recording during the next 4 min of the total 6 min testing period[11].

Mice were considered to be immobile when they ceased struggling and remained floating motionless in water, making only those movements necessary to keep their head above water[12]. Following swimming session, mice were

towel dried and returned to their housing condition.

Open Field

This test utilizes behavioral changes in rodents exposed to novel environments and is used to confirm that the observed antidepressant effect is not due to stimulation of general motor activity. Various types of open field apparatus have been used to test the mice. The open field test was carried out on the dark grey floor subdivided into 16 equal parts in a wooden box (100 cm*100 cm* 30 cm). Respective treatment was given to the animals and 30 min. later, the animal were individually placed in the corner square of the open field[13].

The following parameters observed for 5min.

- Activity in the center (number of center square crossed)
- Spontaneous ambulation (No. of square crossed at periphery)
- Rearing (No. of times the animal stand of the real paws)

Statistical Analysis

All the data represent mean SEM values. The data were analyzed by means of analysis of variance (ANOVA) Whenever ANOVA was significant, further multiple comparisons were made using Tukey's test as the post of hoc test. All analysis was perform using the SPSS statistical software. The level of statistical significance ranged from $p<0.05$ to $p<0.00$.

RESULTS AND DISCUSSION

Forced Swim Test

Repeated oral administration of Piper betle extract for seven consecutive days reduced the immobility time in rat's dose independently. Imipramine also showed similar activity and effect were comparable to higher dose of Piper betle extract. (Table 1)

Tail Suspension Test in Mice

Piper betle extract induced a significant and dose dependent decrease in immobility time in tail suspension test. This effect is regarded as indicative for antidepressant activity. Imipramine also showed significant antidepressant activity and the effect were comparable to that of Piper betle extract. (Table 2)

Table 1: Effect of *Piper betle* extract on immobility time in Forced swimming test

Treatment	Dose (mg/kg)	Immobility time (in sec.)
Vehicle	-	228.5 ± 4.699
Piper betle extract	100	182.5 ± 1.678
Piper betle extract	200	188.25 ± 13.206*
Piper betle extract	400	108 ± 11.754**
Imipramine	15	63.5 ±5.65***

- N=6 in each group. ** indicates significant difference as compared to vehicle treated group at $p<0.01$.
- ***$p<0.001$,*$p<0.05$
- Values are given as mean ± SEM for groups of six animals each

Table 2: Effect of *Piper betle* extract on immobility time in tail suspension test

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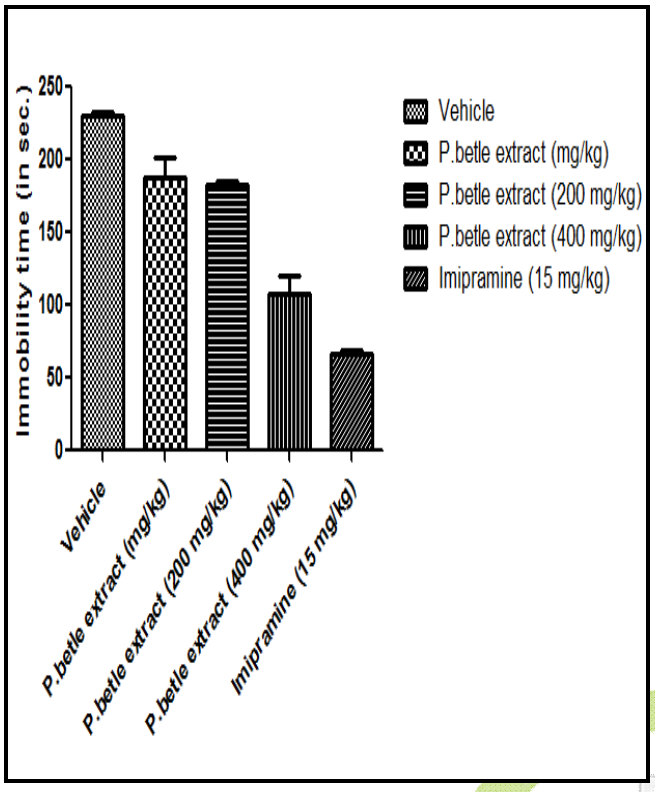

Figure 1: Graphical representation of effect of *Piper betle* extract on immobility time in Forced swimming test

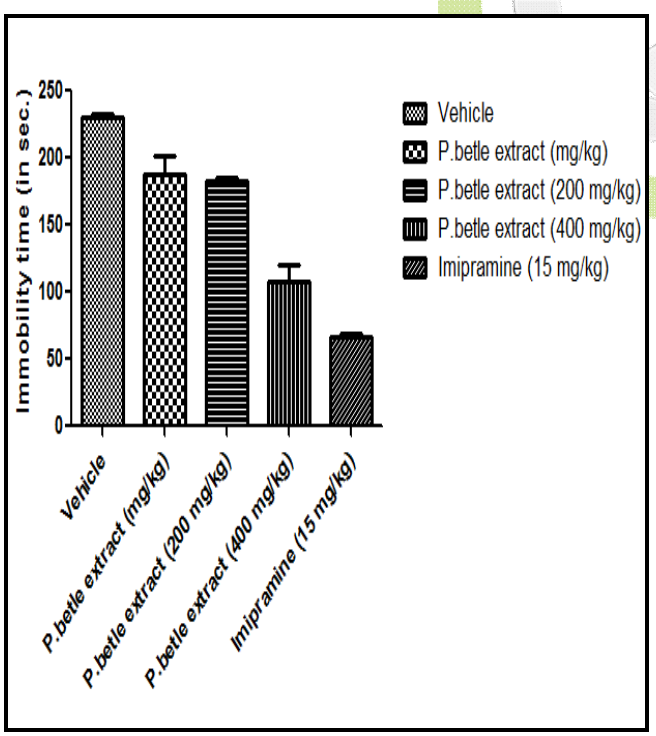

Figure 2: Graphical representation of effect of *Piper betle* extract on immobility time in Tail suspension test

CONCLUSION

The potent antidepressant activity exhibited by the *Piper betle* leaves may be due to the phenolic compounds in this extract such as chavicol, chavibetol, chavibetol acetate and eugenol. The antioxidant effect of the piper betle leaf extract may represent another mechanism that contributes to its antidepressant activity[13-15].

The present investigations have been primarily conducted with the aim of investigating the antidepressant activity of *Piper betle* leaf extract, are summarized as follows with relevant conclusion.

Our experimental observation conform that *Piper betle* possesses significant antidepressant activity. The observed antidepressant activity of Piper betle was qualitatively comparable to that induced by Imipramine.

The investigation indicates that *Piper betle* has antidepressant activity.

ACKNOWLEDGEMENT

We are thankful to the management and staff of Aryakul College of Pharmacy and Research, Lucknow, INDIA and Mr. Aaditya Singh for their kind support throughout the research work, we are thankful to the almighty without whose consent nothing is possible.

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