



## DOSE DEPENDENT ANTI-DEPRESSANT ACTIVITY OF METHANOLIC EXTRACT OF MOMORDICA CHARANTIA SEEDS

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Article Received on  
05 March 2018,

Revised on 26 March 2018,  
Accepted on 16 April 2018,

DOI: 10.20959/wjpps20185-11485

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### ABSTRACT

Momordica charantia (M.charantia) seeds has supposed to have an antidepressant activity by methanolic extract. **Objective:** We investigated the anti-depressant effect of M. charantia methanolic seed extracts (MEMC) on anti-depressant activity in Wister rats. **Materials And Methods:** Momordica charantia was purchased from market. Seeds were shade dried and pulverized in blender. The pulverized extract was mounted on soxhlet extractor using methanol as solvent. The extract was examined for photochemical screening. The residue obtained after extract was examined for forced swimming test for studying anti-depressant activity using Albino Wister rats.<sup>[1]</sup>

**Conclusion:** Momordica charantia Linn is a potential herb in the world. Bitter guard is not only used as an ingredient for cooking delicious delicacies, but it is also used for medical purposes. Bitter guard is having many activities like anti-cancer,<sup>[2]</sup> anti-diabetic,<sup>[3]</sup> anti-inflammatory,<sup>[4]</sup> anti-oxidant,<sup>[5]</sup> anti-genotoxic,<sup>[6]</sup> anti-viral,<sup>[7]</sup> wound-healing activity<sup>[8]</sup> activities. We concluded that it is also having anti-depressant activity by performing different photochemical screenings tests and also forced swimming test by using Wister albino rats at a dose of 100mg/kg and 200mg/kg and exhibited significant anti-depressant activity.

**KEYWORDS:** Momordica charantia seeds, MEMC, anti-depressant activity.

### INTRODUCTION

According to world health report, about 450 million people suffer from a mental or behavioural disorder. By the year 2020, depression is expected to constitute the second largest source of global burden of disease after heart disease. Depression is whole body illness which involves not only mood or emotion but also the physical body and thought process. The symptoms of depression are intense feelings of sadness, hopelessness, and

despair, as well as the inability to experience pleasure in usual activities, changes in sleep patterns and appetite, loss of energy, and suicidal thoughts.

There are two types of mental depression, namely unipolar depression, in which mood swings are always in the same direction and is common (about 75% of cases) non familial, clearly associated with stressful life events and accompanied by symptoms of anxiety and agitation. The second type is bipolar depression (about 25% of cases) sometimes also called as endogenous depression, shows a familiar pattern, unrelated to external stresses and usually appears in early adult life, results in oscillating depression and mania over a period of a few weeks. Patients with depression have symptoms that reflect decrease in brain monoamine neurotransmitters, specifically nor-epinephrine, serotonin and dopamine. 5,00,000/year is diagnosed as suffering from depression.

Although a number of synthetic drugs are being used as the standard treatment for clinically depressed patients, they have adverse effects that can compromise the therapeutic treatment, these common adverse effect include dry mouth, fatigue, gastrointestinal or respiratory problems, anxiety, agitation, drowsiness, and cardiac arrhythmias. Several drug-drug interactions can also occur. These conditions create an opportunity for alternative treatment of depression by use of medicinal plant.<sup>[9]</sup>

### PLANT DESCRIPTION

*Momordica charantia* which is a perennial herb of Kingdom-Plantae, order-Cucurbitales, belongs to family Cucurbitaceae. *Momordia charantia* is an annual or perennial monoecious climber, 2–3 m height with no hair or slightly hairy. It can be cultivated up to high altitude. Stem: The well-branched, slender, green stem is usually slightly five angled or ridged and carries unbranched tendrils in the leaf axils. Root. The central taproot comes to the apex where the stem spreads to climb. Leaf: The leaf is simple, alternate, rounded rim in 4–12 cm long with 3–7 deeply separated lobes. It is carried singly along the stem on 3–5 cm long stalks. It has an unpleasant smell when crushed. Flower: Male and female flowers are separated with a little different. They have five oval yellow petals 10–20 cm long and five central stamens. Fruit: The orange to yellow pendulous cylindrical fruit is egg shaped and 2–10 cm long, which covered with longitudinal ridges and warts. Seed: The seed is 8–15 mm long black but covered with a soft, flesh white in unripe to red in ripe.<sup>[10]</sup>

*Momordica charantia* (Family: *Cucurbitales*), as known as bitter melon or gourd, is a daily consumption as food and traditional medicinal plant in Southeast Asia and Indo-China. It has been shown to possess anti-cancer, anti-diabetic, anti-inflammatory, antioxidant, anti-genotoxic, anti-viral, wound-healing activity and antiulcer properties. Its common photochemical components include alkaloids, charantin, flavonoids, glycosides, phenolic, tannins, and terpenoids. This plant is rich in various saponins including momordicin, momordin, momordicoside, karavilagenin, karaviloside, and kuguacin, all of which have been reported to contribute to its remedial properties including antibacterial, antifungal, antiviral.<sup>[11]</sup>

### PHYTOCHEMICAL SUBSTANCES

The active photochemical substances of *M. charantia* are as follows:

(a) Anthocyanin's, ascorbigen, a bound form of ascorbic acid; (b) carotene, pigment of carpels, while lycopene characterizes the red aril; and (c) charantin, a natural steroidal glycosides mixture of stigmasterol glycosides and sitosterol glycoside, which has anti-diabetic property. There also are flavonoids, quercetin, and luteolin. Saponins include momordicin, momordin, momordicoside, karavilagenin, karaviloside, and kuguacin. Steroids include sitosterol, daucosterol, terpenoids, curcubitacins, and cucurbitane-type triterpenoids, known for its bitterness and antioxidant properties.<sup>[11]</sup>

### MATERIALS AND METHODS

*Momordica charantia* were collected from local area and was authenticated by Dr. L. Rasingam, scientist in charge, Botanical survey of India, Deccan Regional center, Attapur, Hyderabad, Telangana. Fresh seeds were shade dried and pulverized in mechanical blender. The pulverized powder (150gm) was weighed (50gm) and mounted onto the soxhlet extractor and the pulverized powder was extracted using methanol for 48-72hrs. The extract was evaporated with the help of rotary evaporator at room temperature (27<sup>0</sup>c) to yield a solid residue and stored in air tight container for further experimental work.

### Drugs and Chemicals

Methanol, Amitryptaline, other chemicals and reagents to carryout phytochemical screening were of analytical grade obtained commercially.

### Experimental Animals

Albino Wister rats aged 9 weeks and weighing up to 300-350gm were introduced from the National Laboratory animal centre (NLAC), JNTU university, and were allowed to be acclimatized to our laboratory for 7days prior to the treatment. All rats were individually housed in stainless steel metallic cages (20x 30x 13). The controlled temperature ranged from 20-24<sup>0</sup>C with relative humidity ranging from 55-60% and a daily cycle of 12 hour light and 12 hour darkness. We conducted this experiment in departmental animal house at Physiology Division, Department of Zoology, Faculty of science, JNTUH University.

They were provided with a commercial diet and water ad libitum. Albino Wister rats were selected for anti-depressant activity. The animal ethics committee of JNTUH University has approved the experimental protocol according to the ID CPCSE Reg.No:1684/Po/Re/s/13/cpcsea.

### Experimental Design

A Soxhlet Extractor has three main sections: A percolator (boiler and reflux) which circulates the solvent, a thimble (usually made of thick filter paper) which retains the solid to be laved, and a siphon mechanism, which periodically empties the thimble.<sup>[12]</sup>

### Phytochemical Screening Of Memc Seeds

|   |            |
|---|------------|
| <b>Test for Alkaloids:</b> (Mayer's test, Wagners test) | <b>+ve</b> |
| <b>Test for Tannins:</b> (Ferric chloride test)         | <b>+ve</b> |
| <b>Test for saponins:</b> (Foam test)                   | <b>-ve</b> |
| <b>Test for carbohydrates:</b> (Fehling's test)         | <b>+ve</b> |
| <b>Test for proteins:</b> (Nin-hydrine test)            | <b>+ve</b> |
| <b>Test for glycosides:</b> (keller-killiani test)      | <b>+ve</b> |
| <b>Test for flavonoids:</b> (Lead acetate test)         | <b>+ve</b> |
| <b>Test for terpenoids</b>                              | <b>+ve</b> |

### Forced Swimming Test

Swimming was defined as an active movement throughout the swim chamber, which included crossing into another quadrant. Climbing activity (also termed thrashing) consisted of upward directed movements of the forepaws along the side of the swim chamber. FST in glass jar was performed as described by Porsolt et al. with few modifications. This test consists of two parts, an initial training period of 15min followed by actual test for 5 min duration 24 h later. Rats were individually forced to swim inside a vertical borosilicate glass cylinder (height: 40 cm; diameter: 15 cm; containing 15 cm height of water maintained at

25<sup>0</sup>c.<sup>[13]</sup> Rats placed in the cylinder for the first time were initially highly active, vigorously swimming in circles, trying to climb the wall or diving to the bottom. After 2-3 min, activity began to subside and was interspersed with phases of immobility or floating of increasing length.<sup>[14]</sup> After 5n6 min, immobility reached a plateau where the rats remained immobile for approximately 80% of the time. After 15 min in the water, the rats were removed, wiped with dry cloth and allowed to dry before being returned to their home cages. The cylinders were emptied and washed thoroughly after testing for each rat. The rats were again placed in the cylinder 24 h later after three doses of drug (Amitriptyline) and their activity was recorded from above for 5-15min using a digital camera.<sup>[15]</sup> The recordings were later analyzed by a rater who was blinded to the treatment condition, to find the duration of immobility, swimming behavior and climbing behavior in the 5 min test period using stopwatch. An animal was judged to be immobile whenever it remained floating passively in the water in a slightly hunched but upright position, its nose just above the surface, with no additional activity other than that necessary to keep its head above water.<sup>[16]</sup>

### Evaluation of Anti-Depressant Activity

Behavior despair test was performed in two groups of 6 Albino Wister rat. Methanolic extract of *M. charantia* Linn seeds were administered orally to the groups I to II respectively and 20 mg kg<sup>-1</sup> of (drug Standard) was administered intraperitoneal.<sup>[17]</sup> Rat were forced to swim individually in a Plexi glass cylinder (height 45 cm, diameter 20 cm) containing fresh water up to 15 cm for 15 min and the animals were observed for five minutes. In this test, after a brief spell of vigorous activity, animals show a posture of immobility which is characterized by floating motionless in the water making only those movements necessary to keep the head above the water.<sup>[18]</sup> This immobility reflects the state of depression. Each rat was subjected to this test 24 h prior and 1 h after administration of extract and drug.<sup>[19]</sup>

## RESULTS AND DISCUSSION

### Results of control group.

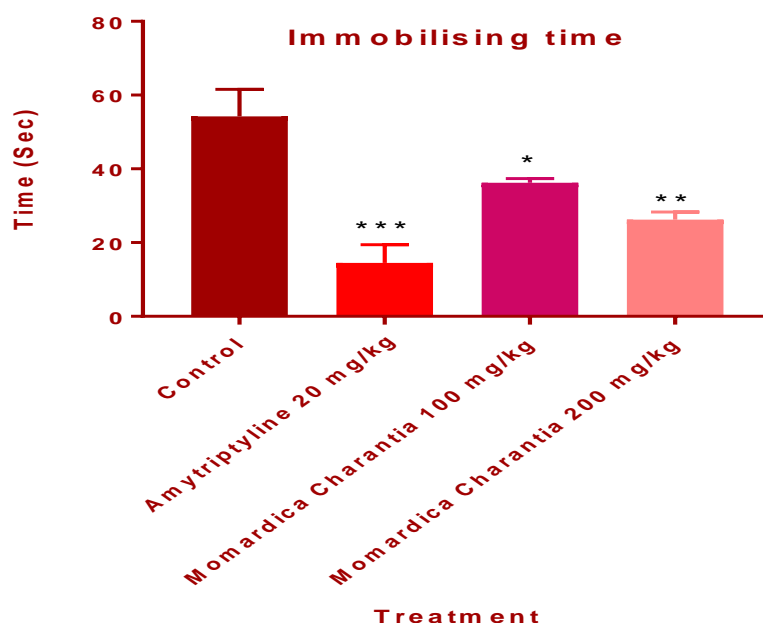
| Experimental group | Animal No | Dose mg/kg  | Immobilization time |
|--------------------|-----------|-------------|---------------------|
| Control            | 1         | -           | 31sec               |
|                    | 2         | -           | 45sec               |
|                    | 3         | -           | 76sec               |
|                    |           | <b>Mean</b> | 49sec               |

**Results of Standard Group.**

| Experimental group (standard) | Animal No | Dose mg/kg  | Immobilization time |
|-------------------------------|-----------|-------------|---------------------|
| Amytriptiline                 | 1         | 20mg/kg     | 12sec               |
|                               | 2         | 20mg/kg     | 10sec               |
|                               | 3         | 20mg/kg     | 7sec                |
|                               |           | <b>Mean</b> | 29sec               |

**Results of Test Group.**

| Experimental group | Dose mg/kg | Duration of Immobilization (sec) |
|--------------------|------------|----------------------------------|
| Negative control   | -          | 54.25 + <sub>7.296</sub>         |
| Positive control   | 20mg/kg    | 14.5+ <sub>4.941</sub>           |
| Extract            | 100mg/kg   | 36.25+ <sub>1.109</sub>          |
| Extract            | 200mg/kg   | 26.25+ <sub>2.056</sub>          |

**CONCLUSION**

MEMC was found to exhibit anti-depressant activity in Albino Wister rats at a dose of 100mg/kg and 200mg/kg which can be accessed by Forced swimming test (FST), further studies need to be carried out for isolation of bioactive principles and ascertain their therapeutic efficacy.

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