

ANTI COMPULSIVE ACTIVITY OF ETHANOL EXTRACT OF LEAVES OF MALVA PARVIFLORA IN MICE

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DOI:(<https://doi.org/10.71146/kjmr568>)

Article Info



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Abstract

Background: Obsessive-compulsive disorder is a widespread mental health condition that affects many individuals globally. *Malva parviflora* L. is a magnificent gift from nature to humanity. This plant has demonstrated its pharmacological promise in treating a variety of illnesses. Leaves are used to treat swelling and wounds. Bruises and broken limbs are treated with a lotion derived from the leaves. Plants have long been recognized as a significant natural antioxidant source. Among these plants is *Malva parviflora*. Flavonoid and phenolic compounds are present in the plant. This is the first ever study which assesses the anti-compulsive activity of *Malva parviflora* L.

Material and method: Each mouse was housed in a standard 22 x 32 x 13.5 cm cage with 24 glass marbles (1.5 cm in diameter) and a 5 cm layer of sawdust. After administering the test substance, the vehicle, and the conventional medication, fluoxetine, the animals were left in their cages for the following half hour. For each mouse, the quantity of marbles buried in the sawdust throughout a 30-minute period was noted.

Result: In the present study, ethanol extract of the leaves of *Malva parviflora* (250 and 500 mg/kg, p.o.) has shown a significant anti-compulsive effect in mice. This is the first report demonstrating the ability of *Malva parviflora* leaves to control obsessive behavior. The results are comparable to the standard drug, fluoxetine.

Conclusion: According to our current research, *Malva parviflora's* active chemical components have a strong anti-compulsive impact. To confirm the mechanism of action behind the results seen in our study, more research is necessary.

Keywords:

Marble burying behaviour, Malva parviflora, Anti-compulsive activity, Fluoxetine.

Introduction:

According to Brown and Barlow (2005), obsessive-compulsive disorder (OCD) is a debilitating mental illness marked by upsetting, persistent thoughts, images, or impulses that are perceived as intrusive and senseless and that cause significant distress or anxiety (obsessions) and/or excessive repetitive intentional behaviors or mental acts (compulsions) meant to counteract this distress. According to Kessler et al. (2005), the disease has a lifetime frequency of 2.3% and substantially impedes social adjustment, work, marriage, family relationships, and socioeconomic position (Murray and Lopez, 1997 Markarian et al., 2010). Because of its high predictive and good face validity, the marble-burying behavior of mice is frequently used to screen for anti-compulsive medications because it mimics some characteristics of obsessive-compulsive behavior (Joel, 2006).

Rats and mice naturally bury unpleasant causes of discomfort in their home habitat by using the available bedding material in both natural and experimental settings (Archer et al., 1987). In order to avoid and defend against the localized threat, burrowing behavior involves pushing the dig-able material forward over the source of aversion using the snout and fore-paws (Poling et al., 1981). According to Wilkie et al. (1979) and Treit (1990), this characteristic behavior, which is typically directed toward a number of classes of harmful and noxious objects, such as food with an unpleasant taste, small predators like scorpions, or electrified prod, is described as a defensive behavior reflecting the anxiety state of animals. The mouse marble-burying test has been utilized as a screening tool for the identification of anxiolytics, despite the ongoing dispute regarding the defensive nature of marble-burying behavior.

Cheese weed, or *Malva parviflora* L., belongs to the Malvaceae family and is a magnificent gift from nature to humanity. This plant has demonstrated its pharmacological promise in treating a variety of illnesses. Leaves are used to treat swelling and wounds. Bruises and broken limbs are treated with a lotion derived from the leaves (Shale, 1999). *M. parviflora* leaves are used to extract purulent wounds that are swollen and irritated (Watt, 1962). *Malva parviflora* has antibacterial (Shale, 2005), antidiabetic (Gutierrez, 2012), antifungal (Bunkers,2001), and other properties, according to pharmacological research. Plants have long been recognized as a significant natural antioxidant source (Gupta, 2006). Among these plants is *Malva parviflora*. Flavonoid and phenolic compounds are present in the plant (Farhan,2011). *Malva parviflora* has demonstrated strong antioxidant properties (Farhan, 2012).

Based on the notion that antioxidant herbs and food are effective in the management of neuropsychological disorders, we assessed the anti-compulsive activity of the plant in mice. This is the first ever study which assesses the anti-compulsive activity of *Malva parviflora* L.

Materials and Methods

Preparation of ethanol extract. *Malva parviflora* leaves were shade-exsiccated at room temperature. 500 grams of the leaves were ground into a fine powder. Ethanol was used to soak the powder for an hour. A percolator was then used to remove the powdered material for 72 hours. In the next stage, a rotary evaporator was used to filter the extract and remove any remaining solvent. The extract was then freeze-dried once more to create a dry powder (Aslam,2014).

Animals Selection:

Male Swiss albino mice weighing between 20 and 25 grams were selected for this study. Five mice were housed in each of the polypropylene cages. The animals were fed standard mouse pellets and unrestricted water. The animals were not fed six hours before to the administration of the medicine and during the experiment.

Division of mice into different groups:

Group I: Normal control, Normal saline 4 mL/kg, *p.o.*; for 60 days

Group II: Treatment group, *Malva parviflora* 250 mg/kg, *p.o.*; for 60 days

Group III: Treatment group, *Malva parviflora* 500 mg/kg, *p.o.*; for 60 days

Group IV: Positive control, Fluoxetine 10 mg/kg, *p.o.*; for 60 days

Marble burying test:

Each mouse was housed in a standard 22 x 32 x 13.5 cm cage with 24 glass marbles (1.5 cm in diameter) and a 5 cm layer of sawdust. After administering the test substance, the vehicle, and the conventional medication, fluoxetine, the animals were left in their cages for the following half hour. For each mouse, the quantity of marbles buried in the sawdust over a 30-minute period was noted (Saadat, 2006; Dixit et al., 2014). The test was carried out on the 15th, 30th, and 60th day of the study, meaning that the animals underwent three examinations throughout the course of the 60-day period.

Statistical analysis:

One-way ANOVA and Tukey's *post hoc* test were used to calculate the statistical significance. The data is expressed as mean \pm SEM. Statistically significant difference was accepted at $P < 0.05$. GraphPad Prism version 5.00 was used as statistical software.

Results:

Marble burying test:

A one-way ANOVA was used to test the difference in the number of marbles buried by four groups of mice. The number of marbles buried by mice showed significant difference between the four groups of animals. The means of treated groups (*Malva parviflora* 250 mg/kg and 500 mg/kg) were compared with the means of the normal control (saline-treated) group using Tukey's *Post hoc* test. The results of the analysis reveal that the number of marbles buried was significantly decreased in treated groups

when compared with the saline-treated group (Table 1,2 and 3). Moreover, administration of Fluoxetine (10 mg/kg, *p.o.*) significantly decreased the number of marbles buried in treated mice. The test was conducted on 15th, 30th and 60th day of the study, that is, the animals were examined 3 times during the 60 days of the study.

Table 1: Effect of *Malva parviflora* on the marble burying behaviour of mice on the 15th day of the study

Treatment	Marbles buried
Control (Saline 4 mL/kg)	15.16 ± 0.65
<i>Malva parviflora</i> 250 mg/kg	11.50 ± 0.89**
<i>Malva parviflora</i> 500 mg/kg	10.20 ± 0.92***
Fluoxetine 10 mg/kg	8.93 ± 0.87***

Number of animals per group (n) = 6.

The observations are given as mean ± S.E.M.

***P<0.001, **P<0.01, *P<0.05; ANOVA followed by Newman-Keuls test.

Table 2: Effect of *Malva parviflora* on the marble burying behaviour of mice on the 30th day of the study

Treatment	Marbles buried
Control (Saline 4 mL/kg)	17.60 ± 0.42
<i>Malva parviflora</i> 250 mg/kg	12.50 ± 0.91**
<i>Malva parviflora</i> 500 mg/kg	10.80 ± 0.66***
Fluoxetine 10 mg/kg	7.76 ± 0.85***

Number of animals per group (n) = 6.

The observations are given as mean ± S.E.M.

***P<0.001, **P<0.01, *P<0.05; ANOVA followed by Newman-Keuls test.

Table 3: Effect of *Malva parviflora* on the marble burying behaviour of mice on the 60th day of the study

Treatment	Marbles buried
Control (Saline 4 mL/kg)	16.83 ± 0.81
<i>Malva parviflora</i> 250 mg/kg	11.10 ± 0.71**
<i>Malva parviflora</i> 500 mg/kg	9.75 ± 0.45***
Fluoxetine 10 mg/kg	8.22 ± 0.41***

Number of animals per group (n) = 6.

The observations are given as mean \pm S.E.M.

***P<0.001, **P<0.01, *P<0.05; ANOVA followed by Newman-Keuls test.

Discussion:

Corticostriatal hyperactivation, which is linked to obsessive-compulsive disorder (OCD), is probably caused by hyposerotonergia. The first line of treatment for OCD is selective serotonin reuptake inhibitors (SSRIs), such as escitalopram (ESC), however medication resistance is still a clinical problem. In actuality, it is yet unknown how SSRIs work to treat OCD. Reduced TRP availability may affect central serotonin concentrations because serotonin must be synthesized from dietary absorbed tryptophan (TRP). Instead of using the serotonin pathway, systemic inflammation encourages the breakdown of TRP through the kynurenine pathway. Further research is required in light of OCD's poor responsiveness to existing serotonergic treatments and the dearth of information demonstrating TRP and serotonin-related gut-immune-brain connections in OCD (De Wolmarans, 2025).

In the present study, ethanol extract of the leaves of *Malva parviflora* (250 and 500 mg/kg, p.o.) has shown a significant anti-compulsive effect in mice. This is the first report demonstrating the ability of *Malva parviflora* leaves to control obsessive behavior. The marble-burying activity of mice was used as a marker index of compulsive behavior that is typical of obsessive-compulsive disorder (OCD) in these investigations, which were conducted using an animal model. According to Njung'e and Handley (1991), marble-burying behavior is an unconditioned, unique defensive response in rats that is not linked to physical danger and does not become habituated after repeated trials. Acute injection of SSRI and tricyclic antidepressants significantly reduces it in male mice (Ichimaru et al., 1995). According to these findings, burying behavior in male mouse models may be helpful in assessing compulsive behavior as opposed to anxiety (Millan et al., 2001). As a result, this paradigm was used in the current studies. According to the current study, marble-burying behavior was decreased by *Malva parviflora* leaves (250 and 500 mg/kg), and this impact was similar to that of fluoxetine (10 mg/kg).

Conclusion:

According to our current research, *Malva parviflora's* active chemical components have a strong anti-compulsive impact. To confirm the mechanism of action behind the results seen in our study, more research is necessary.

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