RESEARCH ARTICLE

Assessment of the Antidepressant Effects of Aqueous Extract from *Morus alba* Leaves in Albino Mice

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ABSTRACT

Background and Aim: The research explored whether the aqueous *Morus alba* (Mulberry) leaves extract showed antidepressant effects in albino mice. Most studies on *Morus alba* medicine originated from traditional medicine yet research documentation about depressive disorders treatment remains scarce.

Study design and methods: Experimental research used different doses of aqueous *Morus alba* leaf extract which were administered to albino mice. The research included control and standard groups given fluoxetine as well as three experimental groups that received different concentrations of *Morus alba* extract (50 mg/kg, 100 mg/kg, or 200 mg/kg) respectively. Depressant-like activity evaluation used the forced swimming test (FST) and tail suspension test (TST) with interactive measurement methods. Measuring serotonin and norepinephrine levels in serum tissue was necessary to identify potential mechanisms during the analysis.

Results: Mice receiving extract of *Morus alba* showed a substantial decrease in immobility periods during FST and TST which indicates a depressive-like effect. Two hundred mg/kg and one hundred mg/kg doses produced optimal results. The treatment groups showed an increase of serotonin and norepinephrine levels at significant levels.

Conclusion: The antidepressant properties of aqueous *Morus alba* leaf extract show similar potency as fluoxetine on albino mice depression symptoms making it a potential candidate for treating depression.

Keywords: *Morus alba*, antidepressant activity, tail suspension test, forced swimming test, serotonin, norepinephrine, albino mice.

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INTRODUCTION

Mental health experts classify depression as one of the world's leading medical disorders as it impacts numerous patients across the globe yearly. The condition leads to continuous sad emotions together with feelings of hopelessness combined with diminished interest in ordinary tasks. Research on depression treatment has increased due to its widespread global occurrence. The widespread antidepressant medications including selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) currently in use produce weight gain alongside sexual dysfunction together with insomnia.[1,2] The attention toward natural remedies used to treat depression has significantly increased during the recent years. Traditional medicine practitioners have been using plants as healing remedies during centuries and modern science confirms many traditional applications.[3] Sleep disturbances and anxiety and stress were treated old medical practices with Mulberry tree (*Morus alba*) member of Moraceae family as medium sized native deciduous species.[4] *Morus alba* functions as an antiinflammatory substance and neuroprotectant as well as having multiple pharmacological properties as an antioxidant.[5] Therapeutic compounds found in the leaves of *Morus alba* are bioactive antiviral agents as well as alkaloids and flavonoids and anthocyanins cause its properties.[6] As of yet, research data does not show evidence that *Morus alba* can be used as a depression medication. The existence of water extract of *Morus alba* leaves as antidepressant is investigated in Albino Mice by the use of behaviorals test with biochemical evaluation.

Two validated laboratory tests that are used to recognize the antidepressant drug activity are the forced swimming test (FST) and then tail suspension test (TST).[7] According to laboratory studies, the drug tests show that a reduction in immobility duration results in better mood conditions. Therefore, these drugs are antidepressants as they alter the levels of serotonin and norepinephrpherine as they affect the mood.[8] Concomitantly, behavioral tests were used to aid in understanding how *Morus alba* extract works in the laboratory evaluation of serum serotonin and norepinephrine content.

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Table 1: Effect of *Morus alba* Extract on Immobility Time in the Forced Swimming Test

Group	Immobility Time (seconds)	p-value
Control	180.5 ± 15.2	-
Fluoxetine	95.2 ± 12.8	<0.05
50 mg/kg *Morus alba*	160.8 ± 14.1	<0.05
100 mg/kg *Morus alba*	125.3 ± 10.4	<0.01
200 mg/kg *Morus alba*	110.1 ± 9.5	<0.01

Table 2: Effect of *Morus alba* Extract on Serum Serotonin and Norepinephrine Levels

Group	Serotonin (ng/ml)	Norepinephrine (ng/ml)	p-value
Control	70.4 ± 5.3	110.5 ± 12.4	-
Fluoxetine	130.7 ± 8.9	180.2 ± 10.6	<0.01
50 mg/kg *Morus alba*	95.5 ± 7.1	135.3 ± 9.5	<0.05
100 mg/kg *Morus alba*	112.8 ± 6.3	155.1 ± 11.2	<0.01
200 mg/kg *Morus alba*	120.4 ± 7.6	170.9 ± 13.4	<0.01

MATERIAL AND METHODS

The study was conducted by an experimental and controlled randomized trail on 48 male albino mice, 20—30 grams. For this experiment, the six distinct groups (eight mice per group) were used for the research.

i. Group 1 (Control): Distilled water (10 ml/kg).
ii. Group 2 (Fluoxetine-treated): Fluoxetine (20 mg/kg, oral).
iii. Group 3 (Low-dose extract): *Morus alba* extract (50 mg/kg).
iv. Group 4 (Medium-dose extract): *Morus alba* extract (100 mg/kg).
v. Group 5 (High-dose extract): *Morus alba* extract (200 mg/kg).
vi. Group 6 (Vehicle): Normal saline (10 ml/kg).

Inclusion Criteria

Male albino mice aged 8–12 weeks. Mice with no previous history of psychiatric disorders. Mice showing normal baseline behavioral activity.

Exclusion Criteria

Pregnant or lactating female mice. Mice showing signs of illness or injury. Mice that do not complete the pre-experiment acclimatization.

Aqueous Extract Preparation

A concentrated extract of *Morus alba* leaves was produced by letting dry leaves soak in distilled water for 24 hours then filtering the solution to remove the extract.

Behavioral Assessment

Forced Swimming Test (FST): Mice were placed in a cylinder filled with water for 6 minutes, and the time spent immobile was recorded.

Tail Suspension Test (TST): Mice were suspended by their tails for 6 minutes, and the immobility time was measured.

Biochemical Analysis

Orbital venous blood sample was collected from the mice, and serum was separated. The levels of serotonin and norepinephrine, using enzyme-linked immunosorbent assays (ELISA) following the manufacturer's protocol the levels were measured.

Statistical Analysis

Statistical analysis were done using one-way ANOVA and further post-hoc analysis was done. p value of <0.05 was considered statistically significant.

RESULTS

Table 1 shows that those group treated with fluoxetine and the *Morus alba* extract-treated groups, especially at 100 mg/kg and 200 mg/kg doses immobility time in FST observed to be significantly reduced. Table 2 shows serotonin and norepinephrine levels in the *Morus alba* treated groups, particularly at the higher doses observed to be significantly increased.

DISCUSSION

Studies have shown that aqueous extract compounds extracted from *Morus alba* leaves display significant antidepressant features by decreasing immobility durations when tested on albino mice through Forced Swimming Test (FST) and Tail Suspension Test (TST).

Experimental data agree with research which demonstrates serotonin together with norepinephrine influence the control of mood disorders.[9,10] The antidepressant properties in *Morus alba* appear to work through serotonin and norepinephrine level increases which researchers detected in treatment groups. This research establishes that larger doses of extract (100 mg/kg and 200 mg/kg) showed superior action as antidepressants.

The antidepressant effect depends on dose in a way that resembles findings from different plant antidepressant analyses.[11,12] Future Researchers should continue studying *Morus alba* mechanism of action since the existing knowledge about bioactive compounds like flavonoids and alkaloids and anthocyanins needs additional investigation. The aqueous extract of *Morus alba* produced test outcomes that matched fluoxetine-dependent antidepressant administration results which makes this extract a potential natural therapy for depression management.

CONCLUSION

The antidepressant properties of *Morus alba* leaves aqueous extract emerge through its ability to decrease albino mouse immobility during FST and TST and enhance serotonin and norepinephrine concentrations. The discovered potential suggests that *Morus alba* has promise as a treatment option for depression but researchers require additional information about its working principles and practical medical benefits.

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