

A COMPARATIVE STUDY OF IN VIVO ANTIOXIDANT PROPERTIES OF *MIMOSA PUDICA* L. AQUEOUS AND ALCOHOLIC PLANT EXTRACTS

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ABSTRACT

Objective: *Mimosa pudica* Linn. is a medicinal plant known for several biological activities, including antioxidant effects. The present investigation was designed to compare the in vivo antioxidant potential of aqueous and alcoholic extracts prepared from *Mimosa pudica* L. in Wistar albino rats. **Materials and Methods:** Adult Wistar albino rats were allocated into four experimental groups: normal control, standard treatment with ascorbic acid, aqueous extract (400 mg/kg), and alcoholic extract (400 mg/kg). The respective treatments were administered orally according to the experimental protocol. At the end of the treatment period, brain tissues were collected and processed for biochemical assessment. Antioxidant status was evaluated by measuring superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH), and thiobarbituric acid reactive substances (TBARS), the latter serving as an indicator

of lipid peroxidation. **Results:** Treatment with both *Mimosa pudica* extracts produced a noticeable improvement in antioxidant status. Increased activities of SOD and CAT, together with higher GSH levels, were observed in extract-treated animals. In contrast, TBARS values declined, indicating reduced lipid peroxidation. The alcoholic extract produced a stronger response than the aqueous preparation and showed antioxidant activity approaching that observed with the standard treatment. **Conclusion:** The findings demonstrate that *Mimosa pudica* leaves possess appreciable in vivo antioxidant activity. Although beneficial effects were observed with both preparations, the alcoholic extract showed comparatively greater efficacy. This difference may be associated with more efficient extraction of antioxidant phytoconstituents into the alcoholic solvent. Further phytochemical and mechanistic investigations would be useful to identify the constituents responsible for these effects.

KEYWORDS: *Mimosa pudica*, antioxidant activity, aqueous extract, alcoholic extract, oxidative stress, SOD, CAT, GSH, TBARS.

1. INTRODUCTION

Oxidative stress develops when the generation of reactive oxygen species (ROS) exceeds the capacity of biological antioxidant systems to neutralize them. Reactive oxygen species are naturally formed during normal cellular metabolism and, at physiological concentrations, participate in processes such as intracellular signaling and immune regulation. Excessive ROS formation, however, can disturb cellular redox homeostasis and promote oxidative modification of important biomolecules, including membrane lipids, proteins, carbohydrates, and nucleic acids. Persistent oxidative injury has therefore been associated with the progression of several pathological conditions, including cardiovascular and neurodegenerative diseases, diabetes, cancer, hepatic disorders, and age-related cellular deterioration.^[1–5]

To limit oxidative damage, living systems possess multiple antioxidant mechanisms. Enzymatic components of this defense network include superoxide dismutase (SOD), catalase (CAT), and glutathione-dependent enzymes, while non-enzymatic protection is provided by molecules such as reduced glutathione (GSH), vitamin C, vitamin E, and other endogenous antioxidants. Together, these components regulate reactive species and help maintain an appropriate intracellular redox environment. When ROS production remains elevated for prolonged periods, these protective mechanisms may become insufficient, resulting in membrane lipid oxidation, mitochondrial dysfunction, inflammatory responses,

and eventual cellular injury.^[2,6,7]

Plant-derived substances have attracted considerable research interest as potential sources of antioxidant compounds. Medicinal plants contain chemically diverse secondary metabolites that may directly neutralize reactive species or support endogenous antioxidant mechanisms. Phenolic compounds and flavonoids are particularly important in this regard because their chemical characteristics allow them to participate in electron or hydrogen donation, interact with transition metals, and interfere with oxidative chain reactions such as lipid peroxidation. Consequently, the antioxidant properties of medicinal plants continue to be explored for their possible applications in conditions involving oxidative imbalance.^[8–10,35–38]

Mimosa pudica Linn., commonly referred to as the sensitive plant or touch-me-not plant, is traditionally placed in the family Mimosaceae and is also classified within Fabaceae. The species grows widely across tropical and subtropical environments and has a long history of use in traditional medicine. Various parts of the plant, including its leaves, roots, stems, and seeds, have been used traditionally for different health-related purposes. Reported applications include the management of wounds, diarrhea, dysentery, inflammatory conditions, piles, fever, urinary complaints, insomnia, epilepsy, and snakebite. Experimental investigations have additionally described antimicrobial, analgesic, anti-inflammatory, antidiabetic, hepatoprotective, wound-healing, neuroprotective, and antioxidant activities of the plant.^[11,12,16–18,20,22]

The pharmacological properties reported for *Mimosa pudica* are thought to be associated with its diverse phytochemical composition. The plant contains several classes of secondary metabolites, including phenolic compounds, flavonoids, tannins, alkaloids, terpenoids, glycosides, saponins, and coumarins, along with the non-protein amino acid mimosine.

Several of these constituents have been associated with antioxidant mechanisms and may contribute to the protection of cellular components against ROS-mediated injury. Previous experimental studies have demonstrated antioxidant effects of *Mimosa pudica* extracts under both in vitro and in vivo conditions.^[12–15,20,21]

The chemical profile of a herbal extract is strongly influenced by the solvent selected during extraction. Differences in solvent polarity affect the type and quantity of phytochemicals recovered from plant material. Water primarily favors the extraction of highly polar and

hydrophilic substances, whereas alcohol can recover a comparatively broader range of phytochemical constituents, including several phenolic and flavonoid compounds.

Differences in extraction efficiency may therefore translate into differences in biological activity. A direct comparison of aqueous and alcoholic preparations under the same experimental conditions can provide useful evidence regarding their relative antioxidant effectiveness.^[11–22]

Despite the established medicinal importance of *Mimosa pudica*, comparatively limited information is available regarding the relative *in vivo* antioxidant performance of its aqueous and alcoholic leaf extracts when assessed under identical experimental conditions. Therefore, the present investigation was designed to compare these two preparations in Wistar albino rats. Antioxidant effects were evaluated in brain tissue using SOD, CAT, and GSH as indicators of endogenous antioxidant defense, while TBARS was measured as an index of lipid peroxidation. The study was intended to provide experimental evidence regarding the antioxidant potential of *Mimosa pudica* and to determine which of the two extracts exhibits greater biological activity.^[35–40]

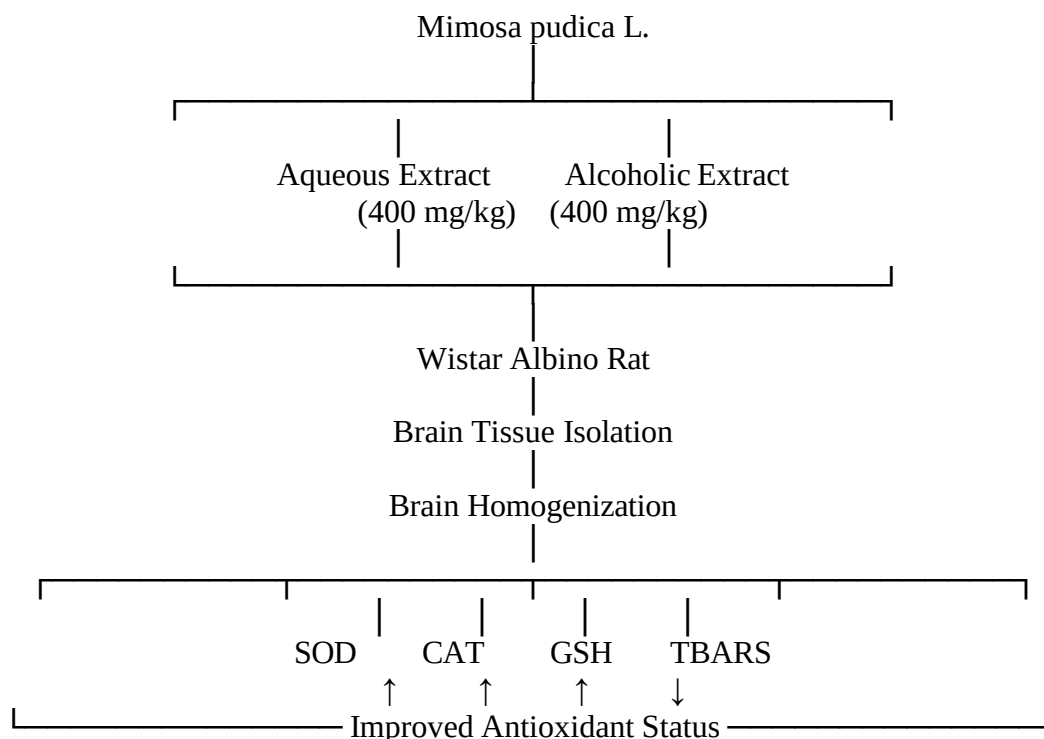


Figure 1: Experimental overview illustrating the evaluation of *in vivo* antioxidant activity of aqueous and alcoholic extracts of *Mimosa pudica* L. in Wistar albino rats by biochemical estimation of SOD, CAT, GSH, and TBARS in brain tissue.

2. MATERIALS AND METHODS

2.1 Chemicals and Reagents

All reagents and chemicals employed during the experimental work were of analytical grade. The major chemicals included ethanol, thiobarbituric acid (TBA), trichloroacetic acid (TCA), hydrogen peroxide (H_2O_2), sodium pyrophosphate buffer, phenazine methosulfate (PMS), nicotinamide adenine dinucleotide (NADH), Ellman's reagent [5,5'-dithiobis-(2-nitrobenzoic acid), DTNB], glacial acetic acid, Tris-HCl buffer, and ascorbic acid. These materials were obtained from standard commercial suppliers. Double-distilled water was used for the preparation of solutions and throughout the experimental procedures.

2.2 Collection and Processing of Plant Material

Fresh specimens of *Mimosa pudica* Linn. were collected from Bareilly, Uttar Pradesh, India, during the flowering period. Botanical authentication of the collected plant material was carried out by a qualified taxonomist from the Department of Botany, Mahatma Jyotiba Phule Rohilkhand University (MJPRU), Bareilly.

Following authentication, the plant material was washed thoroughly with distilled water to eliminate soil, dust, and other adhering impurities. The cleaned material was allowed to dry under shade at room temperature for approximately two weeks. After complete drying, the material was reduced to a coarse powder using a mechanical grinder. The powdered sample was subsequently transferred to airtight containers and preserved until extraction.

2.3 Preparation of Plant Extracts

2.3.1 Aqueous Extract

The dried powdered plant material was subjected to extraction using distilled water as the extraction medium. After extraction, the liquid was initially passed through muslin cloth and subsequently filtered using Whatman No. 1 filter paper to separate suspended and insoluble material.

The resulting filtrate was concentrated under reduced pressure with the help of a rotary vacuum evaporator. Further drying yielded a semisolid aqueous extract, which was transferred to an airtight container and maintained at 4°C until required for the experimental study.

2.3.2 Alcoholic Extract

For preparation of the alcoholic extract, the powdered plant material was extracted with ethanol in a Soxhlet apparatus for 72 h. Following completion of the extraction cycle, ethanol was removed under reduced pressure using a rotary vacuum evaporator.

The concentrated extract was further dried to obtain a semisolid preparation. The final extract was weighed for calculation of percentage yield and then stored in an airtight container at 4°C until experimental use.

2.4 Experimental Animals

Healthy adult Wistar albino rats of either sex, with body weights ranging from 150 to 200 g, were obtained from a CPCSEA-registered animal breeding facility. Animals were maintained in clean polypropylene cages under controlled laboratory conditions.

The animal room was maintained at $22 \pm 2^\circ\text{C}$, with relative humidity between 50 and 60%, and a regular 12 h light/12 h dark cycle. Standard laboratory pellet feed and drinking water were freely available throughout the experimental period. Before initiation of treatment, all animals underwent an acclimatization period of seven days to allow adaptation to laboratory conditions.^[46]

2.5 Ethical Approval

The experimental protocol was reviewed and approved by the **Institutional Animal Ethics Committee (IAEC) of BIU College of Pharmacy, Central Animal House, Bareilly International University, Bareilly, Uttar Pradesh, India**. All experimental procedures involving animals were conducted in accordance with the applicable guidelines of the Committee for Control and Supervision of Experiments on Animals (CPCSEA), Government of India.

IAEC Approval No.: CAH/BIU/2026/017 Date of Approval: 21/02/2026

2.6 Experimental Design

A total of **24 Wistar albino rats** were randomly allocated into four experimental groups, with six animals included in each group (**n = 6**).

Group	Treatment
Group I	Normal Control
Group II	Standard Ascorbic Acid (400 mg/kg body weight, p.o.)
Group III	<i>Mimosa pudica</i> Aqueous Extract (400 mg/kg body weight, p.o.)
Group IV	<i>Mimosa pudica</i> Alcoholic Extract (400 mg/kg body weight, p.o.)

The standard treatment and the respective plant extracts were given orally once daily for a period of seven consecutive days. No additional chemical agent was administered for the induction of oxidative stress during the experiment.

Following completion of the treatment schedule, the animals were sacrificed using the ethically approved laboratory procedure. Brain tissues were promptly removed and washed with ice-cold normal saline to clear residual blood and unwanted material. The collected tissues were subsequently processed for preparation of homogenates and biochemical assessment.

2.7 Preparation of Brain Tissue Homogenate

Excised brain tissues were processed in ice-cold **0.15 M Tris-HCl buffer (pH 7.4)** to prepare a **10% (w/v) tissue homogenate**. Homogenization was performed using a suitable tissue homogenizer while maintaining cold conditions.

The prepared homogenate was centrifuged at **15,000 × g for 10 min at 4°C**. After centrifugation, the clear supernatant was carefully separated and subsequently utilized for biochemical determination of the selected oxidative stress and antioxidant biomarkers.

2.8 Determination of Lipid Peroxidation (TBARS)

The extent of lipid peroxidation in brain tissue was evaluated by determining thiobarbituric acid reactive substances (TBARS). Tissue homogenate was allowed to react with trichloroacetic acid and thiobarbituric acid reagent, followed by heating in a boiling water bath for one hour.

After the reaction mixture had cooled, it was centrifuged to obtain a clear fraction. Formation of the pink-colored reaction product was quantified spectrophotometrically at **532 nm** using a UV–Visible spectrophotometer. TBARS values were reported as **nmol malondialdehyde (MDA)/mg protein**.^[28]

2.9 Determination of Superoxide Dismutase (SOD) Activity

Superoxide dismutase activity was evaluated using the **phenazine methosulfate–NADH method**. The assay mixture contained sodium pyrophosphate buffer, phenazine methosulfate, NADH, and an appropriate quantity of tissue supernatant.

Following the required reaction period, glacial acetic acid was added to terminate the

reaction. Absorbance was then determined at **560 nm** using a UV–Visible spectrophotometer. SOD activity was expressed as **U/mg protein**.^[24]

2.10 Determination of Catalase (CAT) Activity

Catalase activity was assessed on the basis of hydrogen peroxide decomposition in the presence of phosphate buffer. Changes occurring during the reaction were monitored spectrophotometrically, with absorbance measured at **570 nm**. The resulting catalase activity was expressed as **U/mg protein**.^[25]

2.11 Estimation of Reduced Glutathione (GSH)

Reduced glutathione levels were determined using **Ellman's reagent (DTNB)**. Interaction of sulfhydryl groups with DTNB results in the development of a yellow-colored product, which was quantified using a spectrophotometer at **412 nm**. GSH content was expressed as **μmol GSH/g tissue**.^[26,27]

2.12 Statistical Analysis

Experimental observations were summarized as **Mean ± Standard Error of Mean (SEM)**. Statistical evaluation was performed using GraphPad Prism version 10.0.

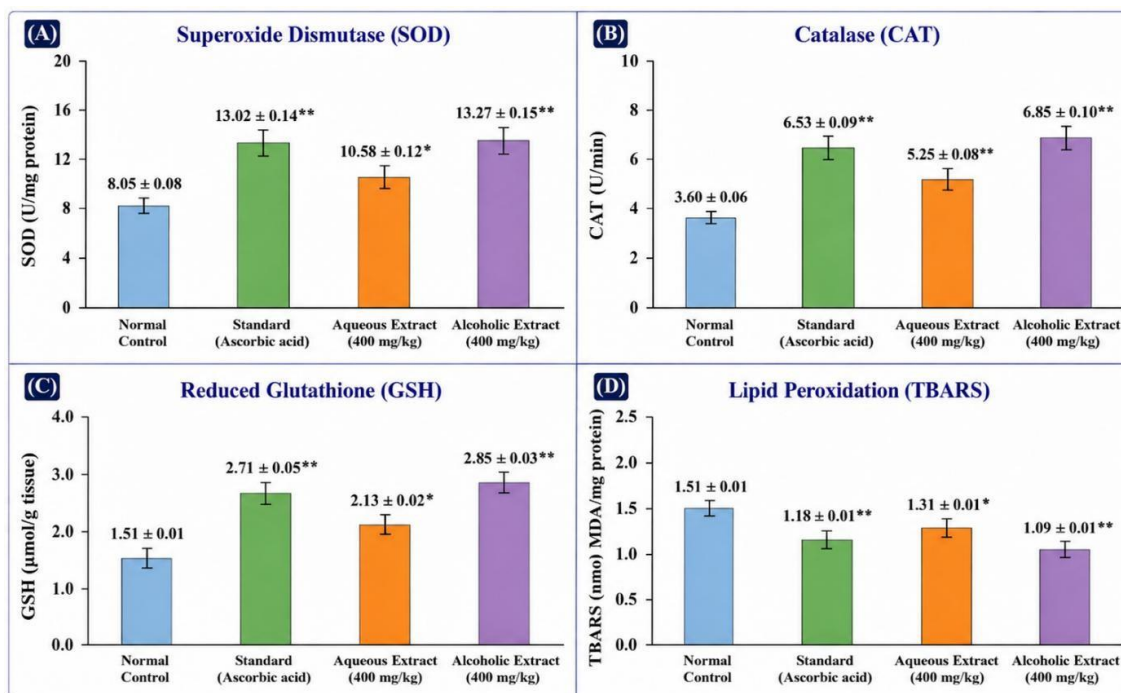
Differences among the four experimental groups were examined by **one-way analysis of variance (ANOVA)**, followed by **Tukey's multiple-comparison post hoc test**. Prior to ANOVA, variance assumptions were evaluated using the Brown–Forsythe and Bartlett's tests. Differences were regarded as statistically significant when **P < 0.05**.

3. RESULTS

Table 1: Effect of *Mimosa pudica* L. aqueous and alcoholic extracts on oxidative stress biomarkers in Wistar albino rats.

Experimental Groups	SOD (U/mg protein)	CAT (U/min)	GSH (μmol/g tissue)	TBARS (nmol/mg protein)
Normal Control	8.05 ± 0.08	3.60 ± 0.06	1.51 ± 0.01	1.51 ± 0.01
Standard (Ascorbic acid)	13.02 ± 0.14	6.53 ± 0.09	2.71 ± 0.03	1.18 ± 0.01
Aqueous Extract (400 mg/kg)	10.58 ± 0.12	5.25 ± 0.08	2.13 ± 0.02	1.31 ± 0.01
Alcoholic Extract (400 mg/kg)	13.27 ± 0.15	6.85 ± 0.10	2.85 ± 0.03	1.09 ± 0.01

Values are expressed as Mean $\pm$ SEM ($n = 6$). Statistical analysis was performed using one-way ANOVA followed by Tukey's multiple comparison test. A value of $P < 0.05$ was considered statistically significant.



Values are expressed as Mean $\pm$ SEM ($n = 6$). Data were analyzed by One-way ANOVA followed by Tukey's multiple comparisons test.

* $P < 0.05$, ** $P < 0.01$ vs. Normal Control.

Figure 2: Effect of *Mimosa pudica* extracts on antioxidant biomarkers in brain tissue. Values are expressed as Mean $\pm$ SEM ($n = 6$). Statistical analysis was performed using one-way ANOVA followed by Tukey's multiple-comparison test.

3.1 Effect of *Mimosa pudica* Extracts on Superoxide Dismutase (SOD)

SOD activity differed considerably among the experimental groups. The normal control animals showed an activity of **8.05 $\pm$ 0.08 U/mg protein**, while treatment with ascorbic acid increased the value to **13.02 $\pm$ 0.14 U/mg protein**.

Animals receiving the aqueous extract of *Mimosa pudica* at 400 mg/kg exhibited an SOD activity of **10.58 $\pm$ 0.12 U/mg protein**. A greater response was recorded with the alcoholic extract at the same dose, where SOD activity reached **13.27 $\pm$ 0.15 U/mg protein**. Thus, although both preparations increased SOD activity relative to the normal control, the response was more pronounced with the alcoholic extract.

Analysis by one-way ANOVA confirmed a significant overall difference among the groups ($F = 396.0$, $P < 0.0001$). Tukey's post hoc comparisons demonstrated increased SOD activity

in the standard and extract-treated groups relative to the normal control. The difference between the alcoholic extract and standard treatment was not statistically significant ($P = 0.4896$), indicating a comparable response for this parameter.

3.2 Effect on Catalase (CAT)

Catalase activity in the normal control group was recorded as 3.60 ± 0.06 U/min. Administration of ascorbic acid produced a higher CAT activity of 6.53 ± 0.09 U/min.

Treatment with the aqueous extract at 400 mg/kg resulted in a CAT value of 5.25 ± 0.08 U/min, whereas animals receiving the alcoholic extract showed 6.85 ± 0.10 U/min. Among the two plant preparations, therefore, the alcoholic extract produced the greater increase in catalase activity.

A significant difference among experimental groups was identified by one-way ANOVA ($F = 326.1$, $P < 0.0001$). Subsequent Tukey's analysis showed that both extract-treated groups differed significantly from the normal control group. The difference between the alcoholic extract and standard treatment was not statistically significant ($P = 0.0567$), indicating a comparable response for CAT activity.

3.3 Effect on Reduced Glutathione (GSH)

The concentration of reduced glutathione also varied among the treatment groups. Animals belonging to the normal control group had a GSH concentration of 1.51 ± 0.01 $\mu\text{mol/g tissue}$. In comparison, the standard group showed an increased concentration of 2.71 ± 0.03 $\mu\text{mol/g tissue}$.

Administration of the aqueous extract increased GSH to 2.13 ± 0.02 $\mu\text{mol/g tissue}$, whereas treatment with the alcoholic extract resulted in the highest observed value of 2.85 ± 0.03 $\mu\text{mol/g tissue}$. The findings therefore indicate that both preparations were associated with increased tissue GSH, with a stronger response following administration of the alcoholic extract.

One-way ANOVA showed a significant overall group effect ($F = 630.2$, $P < 0.0001$). Tukey's multiple-comparison analysis demonstrated significant elevations in GSH in both extract-treated groups relative to the normal control. The alcoholic extract also produced significantly higher GSH levels than the aqueous extract ($P < 0.0001$) and the standard group ($P = 0.0036$).

3.4 Effect on Lipid Peroxidation (TBARS)

Lipid peroxidation was assessed by measuring TBARS levels in brain tissue. The normal control group showed a TBARS concentration of **1.51 ± 0.01 nmol/mg protein**. A lower value of **1.18 ± 0.01 nmol/mg protein** was observed following treatment with ascorbic acid.

The aqueous extract reduced the TBARS value to **1.31 ± 0.01 nmol/mg protein**. A further decrease was observed in animals treated with the alcoholic extract, which showed the lowest concentration at **1.09 ± 0.01 nmol/mg protein**.

Statistical analysis demonstrated a significant difference among the experimental groups ($F = 322.5$, $P < 0.0001$). Tukey's post hoc analysis showed significantly lower TBARS values in both extract-treated groups relative to the normal control. The alcoholic extract also produced significantly lower TBARS levels than both the aqueous extract and standard group ($P < 0.0001$).

Overall, the biochemical findings showed a consistent pattern: treatment with *Mimosa pudica* extracts was associated with **higher SOD, CAT, and GSH values and lower TBARS values**. Across all four measured parameters, the alcoholic extract at 400 mg/kg produced a stronger response than the aqueous extract at the same dose.

4. DISCUSSION

Oxidative stress reflects a disturbance in cellular redox balance that develops when the formation of reactive oxygen species (ROS) exceeds the capacity of endogenous protective mechanisms. When present in excess, reactive species can interact with lipids, proteins, and nucleic acids, potentially altering their structure and normal biological functions. Sustained oxidative damage has consequently been implicated in the development and progression of a variety of chronic disorders. Antioxidant systems counteract these effects through several mechanisms, including the neutralization of reactive species and the regulation of cellular antioxidant defenses.^[1-5]

In the present investigation, the *in vivo* antioxidant effects of aqueous and alcoholic extracts of *Mimosa pudica* leaves were compared in Wistar albino rats. Antioxidant status was examined through four biochemical parameters: superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH), and thiobarbituric acid reactive substances (TBARS). A consistent response was observed across these measurements. Both plant extracts were

associated with increased SOD, CAT, and GSH levels and reduced TBARS values relative to the normal control. However, the magnitude of these changes was greater in animals receiving the alcoholic extract.

Superoxide dismutase represents an important component of enzymatic antioxidant defense because it facilitates the conversion of superoxide radicals into less reactive products, including hydrogen peroxide, which can subsequently be removed by other antioxidant enzymes.^[23,24] In this study, SOD activity increased following treatment with both preparations of *Mimosa pudica*. The aqueous extract produced an SOD value of **10.58 ± 0.12 U/mg protein**, whereas the alcoholic extract increased the activity to **13.27 ± 0.15 U/mg protein**. The latter value was close to that recorded for ascorbic acid (**13.02 ± 0.14 U/mg protein**). These observations suggest that constituents present in the extracts may support endogenous mechanisms involved in controlling superoxide radicals.

Catalase provides another important defense against oxidative injury by promoting the breakdown of hydrogen peroxide into water and molecular oxygen. By limiting the accumulation of hydrogen peroxide, this enzyme contributes to the prevention of subsequent formation of highly reactive oxygen-derived species.^[25] CAT activity increased from **3.60 ± 0.06 U/min** in the normal control to **5.25 ± 0.08 U/min** following aqueous extract administration. A still higher activity of **6.85 ± 0.10 U/min** was recorded with the alcoholic preparation. This pattern indicates a stronger effect of the alcoholic extract on the catalase-associated antioxidant response.

Reduced glutathione is an important intracellular antioxidant involved in maintaining the cellular redox environment and protecting biomolecules against oxidative modification. Its sulfhydryl group enables it to participate in reactions associated with the detoxification of reactive compounds.^[26,27] In the current experiment, GSH concentration increased from **1.51 ± 0.01 µmol/g tissue** in normal control animals to **2.13 ± 0.02 µmol/g tissue** in the aqueous extract group. Treatment with the alcoholic extract resulted in the highest concentration (**2.85 ± 0.03 µmol/g tissue**). These results further indicate that the alcoholic preparation produced a more pronounced effect on the measured antioxidant defense parameters.

In contrast to SOD, CAT, and GSH, a reduction in TBARS is indicative of decreased lipid peroxidation. Reactive species can initiate oxidative degradation of membrane lipids, resulting in the formation of products such as malondialdehyde that can be estimated through

the TBARS assay.^[28,30] The normal control group showed a TBARS value of **1.51 ± 0.01 nmol/mg protein**, while administration of the aqueous extract reduced this value to **1.31 ± 0.01 nmol/mg protein**. The lowest concentration was recorded following alcoholic extract treatment (**1.09 ± 0.01 nmol/mg protein**). Thus, the TBARS findings complement the enzyme and GSH measurements and indicate a lower degree of lipid peroxidation in extract-treated animals, particularly those receiving the alcoholic preparation.

The difference observed between the two extracts may be related, at least in part, to differences in the phytochemicals recovered by the extraction solvents. *Mimosa pudica* has been reported to contain several classes of secondary metabolites, including phenolic compounds, flavonoids, tannins, alkaloids, terpenoids, and other constituents.^[11–22]

Phenolic and flavonoid compounds are particularly relevant to antioxidant activity because their structural characteristics can permit electron or hydrogen donation and interactions with reactive species and transition metals.^[35–40] Ethanol may extract a different or broader range of such constituents than water. However, because the present study did not quantitatively characterize individual phytochemicals in the two preparations, the superior activity of the alcoholic extract **should be interpreted as a possible consequence of its phytochemical composition rather than definitive proof of the underlying mechanism.**

The present observations are broadly consistent with previous reports describing antioxidant properties of *Mimosa pudica*. Earlier investigations have associated the biological activity of this species with its phenolic and flavonoid constituents and have reported free-radical-scavenging and antioxidant effects for different plant extracts.^[11–22] The present study adds to these findings by directly comparing aqueous and alcoholic preparations at the same administered dose. Under the conditions employed here, the alcoholic preparation consistently produced more favorable values across SOD, CAT, GSH, and TBARS.

Statistical evaluation further demonstrated clear differences among the experimental groups. One-way ANOVA yielded **P < 0.0001** for each of the four biochemical parameters. The corresponding F-values were **396.0 for SOD, 326.1 for CAT, 630.2 for GSH, and 322.5 for TBARS**. According to the reported post hoc comparisons, the extract-treated groups differed from the normal control, while the alcoholic extract showed responses comparable with ascorbic acid for selected parameters. Taken together, the statistical and biochemical findings indicate that the alcoholic extract produced the stronger response among the two *Mimosa*

pudica preparations examined.

Overall, the results demonstrate measurable antioxidant-related effects following administration of *Mimosa pudica* extracts. The simultaneous elevation of SOD, CAT, and GSH together with reduction in TBARS provides complementary evidence of an improved antioxidant profile. Although both preparations showed activity, the alcoholic extract consistently produced the greater effect. Further work involving quantitative phytochemical profiling, isolation of active constituents, evaluation of multiple dose levels, and mechanistic studies would be required to determine which compounds account for these observations and how they influence antioxidant pathways.

5. CONCLUSION

The present investigation provides evidence for the *in vivo* antioxidant activity of aqueous and alcoholic leaf extracts of *Mimosa pudica* Linn. in Wistar albino rats. Administration of both extracts was associated with favorable changes in the biochemical parameters used to assess antioxidant status.

Treatment with the plant extracts resulted in increased activities of superoxide dismutase (SOD) and catalase (CAT), along with an elevation in reduced glutathione (GSH). At the same time, a decrease in thiobarbituric acid reactive substances (TBARS) was observed, indicating reduced lipid peroxidation.

When the two preparations were compared at the same dose of **400 mg/kg**, the alcoholic extract produced a greater response than the aqueous extract. This was reflected by higher SOD, CAT, and GSH values together with a lower TBARS level. Under the experimental conditions employed in this study, therefore, the alcoholic extract demonstrated the stronger antioxidant-related effect.

These findings add experimental support to the reported antioxidant potential of *Mimosa pudica*. Nevertheless, additional investigations are required before drawing conclusions regarding its therapeutic or clinical usefulness. Future studies should include detailed phytochemical characterization, evaluation across multiple dose levels, assessment of long-term safety, and investigation of the molecular pathways that may contribute to the observed biological effects.

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7. FUNDING STATEMENT

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8. CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest associated with this research or its publication.

9. ETHICAL APPROVAL

The experimental protocol was reviewed and approved by the **Institutional Animal Ethics Committee (IAEC) of BIU College of Pharmacy, Central Animal House, Bareilly International University, Bareilly, Uttar Pradesh, India**. All procedures involving experimental animals were carried out in accordance with the applicable guidelines of CPCSEA, Government of India.

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10. DATA AVAILABILITY STATEMENT

The data generated and analyzed during this investigation may be obtained from the corresponding author upon reasonable request.

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