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Ayeshabi Saeed Haji
Department of Life Sciences, University of Mumbai, Mumbai, Maharashtra, India

Siddharth Rajendra Maurya
Department of Life Sciences, University of Mumbai, Mumbai, Maharashtra, India

Dr. Nisha Shah
Department of Life Sciences, University of Mumbai, Mumbai, Maharashtra, India

Corresponding Author:
Ayeshabi Saeed Haji
Department of Life Sciences, University of Mumbai, Mumbai, Maharashtra, India

Evaluation of antioxidant, antimicrobial activities, and phytochemical screening in *Mimosa pudica* flower extracts

Ayeshabi Saeed Haji, Siddharth Rajendra Maurya and Dr. Nisha Shah

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Abstract
This study investigates the phytochemical composition, antioxidant activity, and antimicrobial properties of *Mimosa pudica* flower extracts using various solvents, including petroleum ether, ethyl acetate, acetone, chloroform, methanol, ethanol, and distilled water. The primary aim was to assess the influence of different solvents on the extraction efficiency of bioactive compounds and their potential applications. Phytochemical screening revealed the presence of carbohydrates, steroids, proteins, amino acids, flavonoids, terpenoids, saponins, coumarins, and phenols in varying degrees across the extracts. Ethyl acetate and ethanol extracts exhibited the highest phenolic and flavonoid content, with notable antioxidant activity, as indicated by high percentage inhibition in DPPH and ABTS assays and substantial reducing power in the FRAP assay. The antimicrobial evaluation, conducted using the agar well diffusion method, demonstrated significant inhibitory effects of ethyl acetate extract against various bacterial strains, including *E. coli*, *P. aeruginosa*, *S. marcescens*, *B. subtilis*, *S. aureus*, and *S. pyogenes*. Acetone, methanol, and ethanol extracts also showed antimicrobial activity, though with a narrower range of efficacy. The study concludes that *M. pudica* flowers possess considerable antioxidant and antimicrobial potential, with solvent choice significantly impacting the extraction and efficacy of bioactive compounds. These findings suggest that *M. pudica* could be a valuable source of natural antioxidants and antimicrobial agents, warranting further research to isolate and characterize the specific compounds responsible for these activities.

Keywords: *Mimosa pudica*, phytochemical analysis, antioxidant activity, antimicrobial properties, extracts, bioactive compounds

Introduction
The exploration and utilization of plant-based medicinal substances have profoundly shaped human healthcare systems across cultures and epochs. Rooted deeply in traditional medicine practices, herbal remedies often serve as integral components of healthcare in various communities around the globe [1]. These practices have been sustained by the continued efficacy and historical usage of plants in treating diverse ailments. One such plant that has garnered significant attention is *Mimosa pudica*, commonly known as the sensitive plant. This introduction delves into the botanical description, traditional uses, phytochemical profile, and pharmacological activities of *M. pudica*, with a focus on how it addresses contemporary medical concerns. Carl Linnaeus first documented *M. pudica* in 1753. This small, prickly shrub, typically growing to about 0.5 meters in height, is characterized by its fern-like, bipinnate leaves that exhibit a unique sensitivity to touch by folding upon disturbance [2]. The plant features lilac-pink globose flowers and prickly pods, which further contribute to its distinctive botanical profile. Historically, *M. pudica* has been used in various traditional medicine systems, including Ayurveda and Unani, for its multifaceted therapeutic properties. The leaves and roots of this plant are employed in treating a range of conditions, including fistulas, piles, and hydrocele, as well as for their blood-purifying and wound-healing capabilities [3]. Traditional practices highlight the plant's extensive use across different systems of medicine. In Ayurveda, *M. pudica* is prescribed for conditions such as leprosy, dysentery, and asthma. Traditional Unani system employs it for managing bile and blood-related disorders, including jaundice and bilious fevers [4]. The plant's therapeutic scope extends to gynecological ailments and skin disorders, with its various parts-leaves, flowers, stems, roots, and fruits-being utilized in diverse remedies.

Recent studies suggest that *M. pudica* may also hold potential in modern medicine, particularly in areas such as wound healing, anti-helminthic activity, and anti-inflammatory effects [5-7]. Phytochemical analyses have elucidated the presence of several bioactive compounds in *M. pudica*. These include flavonoids, alkaloids, glycosides, and various phenolic compounds, which contribute to its wide range of pharmacological activities [8]. The plant's phytochemical composition varies between its different parts, with notable compounds such as mimosine, a potential hair loss agent, and various saponins and glycosides contributing to its therapeutic efficacy [9]. In terms of pharmacological activity, *M. pudica* has demonstrated significant wound-healing properties. Research indicates that methanol extracts from its roots and shoots can accelerate wound recovery, outperforming standard treatments like gentamicin [10]. The plant's effectiveness extends to anti-helminthic activity, where aqueous leaf preparations have shown promise against earthworm parasites, reflecting its potential as an alternative to conventional anthelmintics [11]. Additionally, *M. pudica* exhibits anti-hepatotoxic effects, with ethanolic leaf extracts mitigating liver damage induced by carbon tetrachloride in experimental models [12]. Beyond these activities, *M. pudica* has also been explored for its potential antifertility effects, anxiolytic properties, and antidiabetic activities. Studies on antifertility demonstrate alterations in the reproductive cycle of female mice, while anxiolytic effects have been observed in rats, potentially due to its interaction with GABA receptors [13, 14]. Moreover, the plant's hypoglycemic effects have been corroborated through its ability to lower blood glucose levels in diabetic rat models [15]. The multifaceted nature of *M. pudica*'s pharmacological properties underscore its potential as a versatile therapeutic agent. However, despite its broad spectrum of activity, it is crucial to approach its application with a thorough understanding of its safety profile. While traditional uses and preliminary studies offer promising insights, further research is necessary to fully elucidate its efficacy and safety in clinical settings. Continued exploration into its pharmacological mechanisms and interactions will be essential for harnessing its full therapeutic potential and integrating it effectively into modern medical practices. In summary, *M. pudica* represents a fascinating convergence of traditional knowledge and modern scientific inquiry. Its extensive use in traditional medicine systems, coupled with emerging evidence of its diverse pharmacological activities, highlights the need for ongoing research and standardization efforts to better understand and utilize this remarkable plant in contemporary healthcare contexts [1, 8].

Materials and methods

Collection and Preparation of *Mimosa pudica* Flowers for Extract Preparation

M. pudica flowers were collected from the University of Mumbai campus in February. It was ensured that the plant was healthy and uninfected. The collected flowers were washed under running tap water to eliminate dust and other undesirable material and to cleanse the flowers thoroughly and dried under shade until the water molecules evaporated and the plant became well dried for extract preparation.

The cold extract was prepared at a 50% w/v concentration. 10 g of flower and 20 ml of solvent were grounded using a mortar and pestle in several solvents, including petroleum ether, ethyl acetate, chloroform, acetone, methanol, ethanol, and distilled water. Then, it was filtered using Whatman's filter paper No. 1. The filtrate was collected and placed in a clean bottle in the refrigerator.

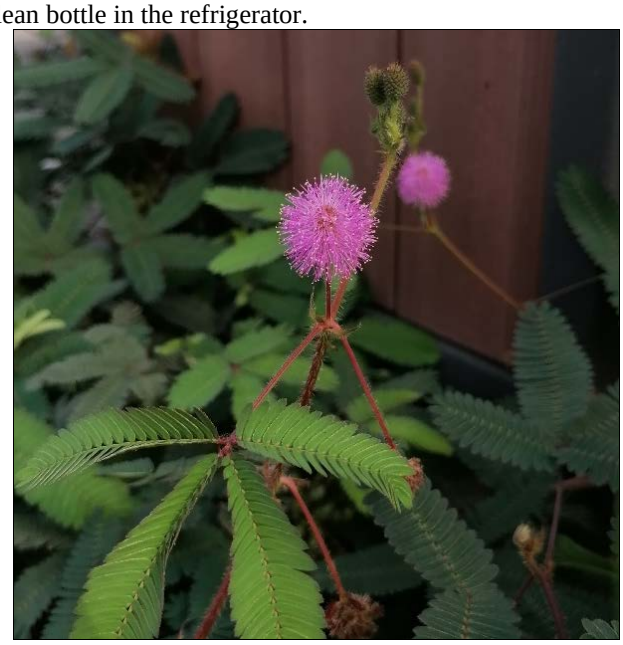

Fig 1: *Mimosa pudica* flowers

Phytochemical analysis

Chemical tests for the screening and identification of bioactive chemical constituents in the *M. pudica* flower under study were carried out in extracts using the standard procedures.

Test for Carbohydrates: Add 1 ml of extract and 1 ml of Benedict's reagent, then boil the mixture in a water bath for 5-10 minutes, resulting in green, yellow, or red coloration, indicating the presence of carbohydrates [16].

Test for Steroids: Combine 2 ml of extract with 2 ml of $CHCl_3$ and 2 ml of H_2SO_4, resulting in violet to blue-green coloration, indicating the presence of steroids [17].

Test for Protein: Mix 2 ml of extract with Ninhydrin reagent and heat in a boiling water bath for 10 minutes, resulting in a violet color ring or blue color, confirming the presence of protein [18].

Test for Amino Acids: Combine 2 ml of extract with 2 ml of Ninhydrin reagent and heat in a hot water bath for 20 minutes, resulting in the appearance of a purple color, indicating the presence of amino acids [18].

Test For Flavonoids: In 5 ml of diluted ammonia solution, add 2 ml of extract, and a few drops of concentrated H_2SO_4, resulting in yellow coloration disappearing on standing or blackish-red color, indicating the presence of flavonoids [19].

Test For Terpenoids: Combine 2 ml of extract with 2 ml of chloroform and 3 ml of concentrated H_2SO_4, resulting in a monolayer of reddish-brown color, confirming the presence of terpenoids [20].

Test for Cardiac Glycosides: Add 1 ml of extract, 1 ml of chloroform, and concentrated H_2SO_4, resulting in reddish-brown color, confirming the presence of cardiac glycosides [20].

Test For Tannins: Mix 2 ml of extract with 2 ml of water and add 2-3 drops of 5% $FeCl_3$, resulting in blue-black

coloration, indicating the presence of tannins [16].

Test for Saponins: Combine 1 ml of extract with 1 ml of distilled water, then shake or vortex, resulting in froth appearing, confirming the presence of saponins [21].

Test for Phenols: Combine 2 ml of extract with 3 ml of ethanol and a pinch of $FeCl_3$, resulting in a greenish-yellow color, confirming the presence of phenols [17].

Total phenolic content

Total phenolic contents in the *M. pudica* flowers extracts were determined by Folin–Ciocalteu colorimetric method as described by scientists with some minor modifications [22]. Standard gallic acid solution was prepared by dissolving 1 mg of it in 10 ml of methanol (0.1 mg/ml). Various concentrations of gallic acid solutions in methanol were prepared from the standard solution. To each concentration, 5 ml of 10% Folin–Ciocalteu reagent (FCR) and 4 ml of 7% Na_2CO_3 were added making a final volume of 10 ml. The mixture obtained, which exhibited a blue color, was thoroughly mixed and then incubated at 40°C in a water bath for 30 min. Following incubation, the absorbance of the mixture was measured at a wavelength of 760 nm against a blank. The FCR reagent, upon reacting with phenols present in the *M. pudica* flower extracts, undergoes oxidation, and transforms into a dark blue color, which is subsequently measured using a UV-visible spectrophotometer. All experiments were conducted in triplicate, and the average absorbance values obtained at various concentrations of gallic acid were utilized to construct the calibration curve. The procedure described for the standard gallic acid was followed, and the absorbance of each extract was recorded. Triplicate samples were prepared for each analysis, and the average absorbance value was employed to generate the calibration curve for determining the phenolic levels in the extracts. Gallic acid was employed as the reference standard compound, and the results are expressed in terms of gallic acid equivalents (µg/ml) [23].

Total Flavonoids Content

The total flavonoid content of the sample was determined using the aluminum chloride colorimetric method with certain modifications. A stock solution of quercetin (0.1 mg/ml) was prepared by dissolving 2 mg of quercetin in 20 ml of methanol. This stock solution was subsequently diluted to obtain various concentrations. The total flavonoid content was expressed as a quercetin equivalent using a linear equation derived from the calibration curve. Different solvents were employed to prepare the extracts. For the analysis, 0.6 ml of the diluted standard quercetin solutions or extracts was mixed separately with 0.6 ml of a 2% aluminum chloride solution. After thorough mixing, the resulting solution was incubated for 60 min at room temperature. The absorbance of the reaction mixtures was measured at a wavelength of 420 nm using a UV-Vis spectrophotometer, with a blank used for reference. The standard protocol for quercetin analysis was applied to *M. pudica* flower extracts, and the absorbance of each extract was measured and documented. The concentration of total flavonoid content in the test samples was determined using the calibration plot and expressed as milligrams of quercetin equivalent (QE) per gram of plant material. All determinations were performed in triplicate [22].

Antioxidant Activity

DPPH (2, 2-Diphenyl-1-Picrylhydrazyl) Activity

The measurement of the DPPH free radical scavenging activity was performed according to methodology described by scientists with slight modifications [24]. Methanol as a diluent. Freshly prepared, 2 mg Trolox was dissolved in 20 ml of methanol and working stock of 0.1 mg/ml was prepared as standard. DPPH (2,2-diphenyl-1-picrylhydrazyl) was dissolved in methanol; 0.5 mM solution of DPPH was prepared by dissolving 0.019g in 100 ml of methanol. Freshly prepared, extracts of various solvents [25]. 1ml of 0.5mM DPPH solution in methanol was mixed with 1 ml of *M. pudica* flower extracts solution of varying concentrations from 10 to 100 µg/ml with an interval of 10 µg/ml. Corresponding Trolox was used as reference standard. Mixture of 1 ml methanol and 1ml DPPH solution used as a control and methanol is used as blank. The decrease in absorbance was measured at 517nm after 30 minutes inhibition in dark and using a UV-VIS spectrophotometer. The inhibition % was determined using the following formula.

Percentage inhibition = ((AB–AA)/ AB) ×100

Where, AB is absorbance of DPPH + methanol; AA is absorbance of DPPH + sample extract/Trolox.

Ferric Reducing Antioxidant Potential (FRAP) assay

The antioxidant capacity of the *M. pudica* flower extracts was estimated spectrophotometrically following the procedure described by scientists with some minor modifications [26]. FRAP reagent- Add 10mM TPTZ in 40mM HCl, 20mM $FeCl_3$, 300 mM acetate buffer (pH 3.6) and mix in ratio of 1:1:10. The fresh working solution was prepared by mixing 25 ml acetate buffer, 2.5 ml TPTZ solution, and 2.5 ml $FeCl_3.6H_2O$ solution and then warmed at 37 °C before use. Freshly prepared, 10 mg Trolox dissolved in 20 ml of methanol and working stock of 0.5 mg/ml was prepared as standard. Different concentrations of standard (150uL) were allowed to react with 2850 µl of the FRAP solution for 30 min in the dark condition. Readings of the colored product [Ferrous tripyridyl triazine complex] were then taken at 593 nm. The standard curve was linear between 100 to 500 µg/ml Trolox. 10 µl of extract was added in 2990 µl of FRAP reagent. The absorbance was then represented as Trolox equivalent mg per gram of sample [27].

ABTS (2, 2'-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) Assay

The antioxidant capacity of *M. pudica* extracts was determined by ABTS radical cation decolorization assay. The ABTS cation radical was produced by the reaction between 7 mM ABTS in water and 2.45 mM potassium persulfate (1:1), stored in the dark at room temperature for 12-16 hours before use. ABTS solution was then diluted with methanol to obtain an absorbance of 0.700 at 734 nm. Trolox was used as standard substance. Stock solution (1mg/ml) of Trolox was prepared by dissolving 10 mg of Trolox in 10 ml of methanol. This stock solution was diluted serially to make various concentrations. 5 µl of volume from each concentration was added in 3.995 ml of diluted ABTS solution, the absorbance was measured at 30 min after the initial mixing. 5 µl of flower extract to 3.995 ml of diluted ABTS solution, the absorbance was measured at 734 nm after 30 min after the initial mixing. An appropriate solvent blank was run in each assay. All the

measurements were carried out at least three times. Percent inhibition of absorbance at 734 nm was calculated using the formula,

ABTS scavenging effect (%) = ((AB–AA)/ AB) ×100

Where, AB is absorbance of ABTS radical + methanol; AA is absorbance of ABTS radical + sample extract/Trolox [28].

Antimicrobial Assay by Agar Well Diffusion Methods

The Agar well diffusion method is widely used to evaluate the antimicrobial activity of *M. pudica* flower extracts. The nutrient agar plate is bulk seeded by adding a volume of 200 µl the microbial inoculum in the agar. Three Gram negative organisms, *Escherichia coli*, *Pseudomonas aeruginosa* and *Serratia marcescens* and three Gram positive organisms, *Bacillus subtilis*, *Staphylococcus aureus* and *Streptococcus pyogenes* were used to check the antimicrobial activity. Then, a hole with a diameter of 8 mm is punched aseptically with a sterile cork borer, and a volume (200 µl) of the extract solution at 50% w/v is introduced into the well. The plates were kept at 4ºC for diffusion of extract into the nutrient agar medium. Then, agar plates are incubated 37 °C and the zone of inhibition was observed after 48 hours. The antimicrobial agent diffuses in the agar medium and inhibits the growth of the microbial strain tested. All the determinations were carried out in triplicate [29].

Results

Phytochemical analysis

The phytochemical screening of the *M. pudica* flower extracts was performed using various solvents, including petroleum ether, ethyl acetate, acetone, chloroform, ethanol, methanol, and distilled water. The results indicated the presence or absence of specific phytochemicals in each solvent extract. Carbohydrates were detected in all solvents except chloroform. The highest concentration was observed in ethyl acetate and distilled water, while petroleum ether, acetone, and methanol showed a moderate presence. Ethanol also exhibited a higher concentration of carbohydrates. Steroids were absent in petroleum ether and chloroform extracts but were present in all other solvents. Ethyl acetate, acetone, ethanol, methanol, and distilled water showed a consistent presence of steroids. Proteins were absent in petroleum ether, ethyl acetate, chloroform, and distilled water extracts. However, they were detected in acetone, ethanol, and methanol extracts. Amino acids followed a similar pattern to proteins, being absent in petroleum ether, ethyl acetate, chloroform, and distilled water extracts but present in acetone, ethanol, and methanol extracts. Flavonoids were present in ethyl acetate and distilled water extracts but were absent in petroleum ether, acetone, chloroform, ethanol, and methanol extracts. Terpenoids were absent in petroleum ether and chloroform extracts but present in ethyl acetate, acetone, ethanol, methanol, and distilled water extracts. Saponins were detected only in the distilled water extract and were absent in all other solvent extracts. Coumarins were present in ethyl acetate, acetone, ethanol, methanol, and distilled water extracts but were absent in petroleum ether and chloroform extracts. Phenols were detected in acetone, ethanol, methanol, and distilled water extracts but were absent in petroleum ether, ethyl acetate, and chloroform extracts. These findings indicate the differential solubility and presence of various phytochemicals in the *M. pudica* flower extracts depending on the solvent used.

Total phenolic content

The phenolic content varied significantly among the different solvent extracts. The petroleum ether extract exhibited the lowest phenolic content, measuring 11.526 µg/ml. Similarly, the chloroform extract had a low phenolic content of 12.062 µg/ml. In contrast, the ethyl acetate extract showed a considerably higher phenolic content, recording 70.540 µg/ml. The acetone extract demonstrated an even higher phenolic content, with a value of 84.892 µg/ml. Methanol and ethanol extracts also exhibited substantial phenolic contents, with values of 66.685 and 96.245 µg/ml, respectively. The distilled water extract contained 74.503 µg/ml, indicating a significant presence of phenolic compounds.

Total Flavonoids Content

The phenolic content varied among the different solvent extracts. The petroleum ether extract exhibited a phenolic content of 9.5307 mg/g, while the chloroform extract showed a similar phenolic content of 9.5575 mg/g. The ethyl acetate extract demonstrated a significantly higher phenolic content, measuring 24.465 mg/g. The acetone extract had a phenolic content of 20.980 mg/g, and the methanol extract showed a substantial phenolic content of 23.420 mg/g. The ethanol extract exhibited a high phenolic content of 24.1172 mg/g. The distilled water extract contained 21.0068 mg/g of phenolic compounds.

Antioxidant Activity

DPPH (2, 2-Diphenyl-1-Picrylhydrazyl) Activity

The antioxidant activity of the *M. pudica* flower extracts were evaluated using the DPPH assay, with results expressed as the percentage inhibition of DPPH absorbance at 517 nm by different solvent extracts. The petroleum ether extract showed a percentage inhibition of 43.61%. The ethyl acetate extract exhibited the highest antioxidant activity with a percentage inhibition of 95.27%. The acetone extract demonstrated a significant antioxidant activity with a percentage inhibition of 78.00%. The chloroform extract showed a moderate antioxidant activity with a percentage inhibition of 49.27%. Both methanol and ethanol extracts exhibited high antioxidant activities, with percentage inhibitions of 93.85% and 93.86%, respectively. The distilled water extract demonstrated a percentage inhibition of 44.16%.

Ferric Reducing Antioxidant Potential (FRAP) Assay

The reducing power of the *M. pudica* flower extracts were evaluated by measuring the absorbance at 595 nm. The petroleum ether extract showed a reducing power of 155.010 mg/g. The ethyl acetate extract exhibited a significantly higher reducing power of 398.063 mg/g. The acetone extract demonstrated the highest reducing power among the tested solvents, with a value of 401.071 mg/g. The chloroform extract had a lower reducing power, measured at 112.295 mg/g. The methanol extract showed a substantial reducing power of 275.935 mg/g. The ethanol extract exhibited the highest reducing power, with a value of 424.534 mg/g. The distilled water extract demonstrated a considerable reducing power of 366.779 mg/g.

ABTS *(2,* 2'-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) Assay

The antioxidant activity of the *M. pudica* flower extracts were evaluated using the ABTS assay, with results expressed as the percentage inhibition of ABTS absorbance at 734 nm by different solvent extracts. The petroleum ether extract showed

a percentage inhibition of 1.65%. The ethyl acetate extract exhibited a higher antioxidant activity with a percentage inhibition of 6.25%. The acetone extract demonstrated a moderate antioxidant activity with a percentage inhibition of 5.49%. The chloroform extract showed a low antioxidant activity with a percentage inhibition of 1.57%. The methanol extract exhibited the highest antioxidant activity among the tested extracts, with a percentage inhibition of 6.97%. The ethanol extract showed a percentage inhibition of 2.18%. The distilled water extract demonstrated a percentage inhibition of 3.33%.

Antimicrobial Assay by Agar Well Diffusion Method

The antimicrobial activity of various extracts of *M. pudica* was assessed against a range of bacterial strains, including *E. coli*, *P. aeruginosa*, *S. marcescens*, *B. subtilis*, *S. aureus*, and *S. pyogenes*. The zones of inhibition were measured in millimeters (mm) after 48 hours. The ethyl acetate extract showed notable antimicrobial activity with zones of inhibition of 13 mm against *E. coli*, 11 mm against *P. aeruginosa*, 10 mm against *S. marcescens*, 15 mm against *B. subtilis*, 20 mm against *S. aureus*, and 15 mm against *S. pyogenes*. The acetone extract exhibited a zone of inhibition of 13 mm against *B. subtilis*. The methanol extract also showed antimicrobial activity with a zone of inhibition of 10 mm against *B. subtilis*. The ethanol extract demonstrated inhibitory effects with zones of inhibition of 11 mm against *B. subtilis* and 10 mm against *S. aureus*. The petroleum ether, chloroform, and distilled water extracts showed no inhibitory activity against any of the tested bacterial strains.

Discussion

The phytochemical screening of *M. pudica* flower extracts revealed a varied presence of bioactive compounds depending on the solvent used. Carbohydrates were present in all extracts except for chloroform, with ethyl acetate and distilled water showing the highest concentrations. This suggests that these solvents are more effective in extracting carbohydrate compounds from the *M. pudica* flower extracts. Steroids were detected across most solvents except petroleum ether and chloroform, indicating that these compounds are relatively soluble in ethyl acetate, acetone, ethanol, methanol, and distilled water. Proteins and amino acids were only present in acetone, ethanol, and methanol extracts, suggesting that these solvents are particularly effective for extracting these types of compounds. Flavonoids were detected only in ethyl acetate and distilled water extracts, while terpenoids were present in ethyl acetate, acetone, ethanol, methanol, and distilled water extracts but not in petroleum ether and chloroform extracts. Saponins were unique to the distilled water extract, and coumarins were found in ethyl acetate, acetone, ethanol, methanol, and distilled water extracts but not in petroleum ether and chloroform extracts. Phenols were detected in acetone, ethanol, methanol, and distilled water extracts, underscoring the differential solubility of phenolic compounds. The total phenolic content in the extracts varied widely, with ethanol showing the highest phenolic content (96.245 µg/ml) and petroleum ether showing the lowest (11.526 µg/ml). This variation highlights the efficacy of different solvents in extracting phenolic compounds, with ethanol proving to be the most effective among those tested. The total flavonoid content was highest in ethyl acetate (24.465 mg/g) and lowest in petroleum ether (9.5307 mg/g), indicating that ethyl acetate is a more effective solvent for extracting flavonoids.

The antioxidant activity of the extracts, as assessed by DPPH scavenging activity, revealed that ethyl acetate, methanol, and ethanol extracts exhibited the highest inhibition percentages (95.27%, 93.85%, and 93.86%, respectively), indicating their strong antioxidant potential. The acetone extract also showed significant antioxidant activity with a 78.00% inhibition. The FRAP assay further supported these findings, with ethanol and acetone extracts showing the highest reducing powers (424.534 mg/g and 401.071 mg/g, respectively). The ABTS assay, however, showed lower antioxidant activity across the extracts, with ethyl acetate and methanol showing the highest percentage inhibition (6.25% and 6.97%, respectively). In terms of antimicrobial activity, the ethyl acetate extract demonstrated the broadest spectrum of inhibition, effectively inhibiting all tested bacterial strains, including *E. coli*, *P. aeruginosa*, *S. marcescens*, *B. subtilis*, *S. aureus*, and *S. pyogenes*. The acetone, methanol, and ethanol extracts showed selective antimicrobial activity, particularly against *B. subtilis* and, in some cases, *S. aureus*. The absence of activity in petroleum ether, chloroform, and distilled water extracts suggests that these extracts do not possess significant antimicrobial properties or that the antimicrobial compounds are not effectively extracted by these solvents. Overall, the results indicate that different solvents are effective in extracting various bioactive compounds from *Mimosa pudica* flowers. Ethyl acetate and ethanol extracts showed high levels of phenolic and flavonoid content, strong antioxidant activity, and broad antimicrobial activity. These findings suggest that *Mimosa pudica* has potential as a source of natural antioxidants and antimicrobial agents, with solvent extraction playing a critical role in the efficacy of these bioactive compounds. Further studies are needed to isolate and identify the specific compounds responsible for these activities and to explore their potential applications in pharmaceuticals and natural health products.

Conclusion

The study on *Mimosa pudica* flower extracts revealed significant variations in the presence of bioactive compounds and their corresponding activities based on the solvent used for extraction. Ethyl acetate and ethanol emerged as the most effective solvents for extracting phenolic and flavonoid compounds, showing the highest levels of total phenolics and flavonoids. These extracts also exhibited superior antioxidant activities, as evidenced by their high percentage inhibition in the DPPH and ABTS assays, as well as their strong reducing power in the FRAP assay. In terms of antimicrobial activity, the ethyl acetate extract demonstrated the broadest spectrum of inhibition against various bacterial strains, indicating its potential as a valuable antimicrobial agent. The acetone, methanol, and ethanol extracts also displayed notable antimicrobial effects, particularly against certain bacterial strains, suggesting their utility in treating infections. Overall, the findings highlight the potential of *M. pudica* as a source of natural antioxidants and antimicrobial agents. The choice of solvent significantly influences the extraction efficiency of bioactive compounds, underscoring the importance of solvent selection in optimizing the extraction process for pharmaceutical and therapeutic applications. Future research should focus on isolating and characterizing the specific bioactive compounds responsible for these activities to better understand their mechanisms and explore their potential applications in medicine and health.

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Conflict of interest
The authors declare that they have no competing or conflict of interest.

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