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Evaluation of Wound Healing Potential of *Mimosa tenuiflora* Using Excision Wound Model in Wistar Rats

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ABSTRACT:
The present study was carried out to evaluate the wound healing potential of Mimosa tenuiflora using the excision wound model in Wistar rats. Different extracts of Mimosa tenuiflora bark were prepared by successive Soxhlet extraction using petroleum ether, chloroform, ethyl acetate, and methanol. The extracts were subjected to physicochemical evaluation, preliminary phytochemical screening, TLC analysis, and in vitro antioxidant studies including DPPH, hydrogen peroxide scavenging, superoxide radical scavenging, and reducing power assays. Among all extracts, the methanolic extract (MEMT) exhibited significant antioxidant activity with lower IC_{50} values and higher phenolic and flavonoid contents. Topical gel formulations of MEMT were prepared and evaluated for wound healing activity in Wistar rats using the excision wound model. MEMT-treated groups showed significant enhancement in percentage wound contraction, hydroxyproline, hexosamine, protein content, and antioxidant enzyme levels compared to the control group. Histopathological studies also revealed improved collagen deposition, fibroblast proliferation, angiogenesis, and re-epithelialization in treated groups. The findings suggest that Mimosa tenuiflora possesses significant wound healing activity, which may be attributed to the presence of bioactive phytoconstituents with antioxidant and tissue regenerative properties. The study supports the traditional use of Mimosa tenuiflora in wound management and indicates its potential as a natural wound healing agent.

1. INTRODUCTION:
Wounds are defined as disruptions in the normal anatomical and functional integrity of the skin or underlying tissues caused by physical, chemical, thermal, or biological injury. The skin acts as the primary protective barrier of the body against microbial invasion, dehydration, and environmental hazards; therefore, damage to this barrier initiates a complex physiological process aimed at restoring tissue integrity and function [1]. Wounds may occur due to trauma, burns, surgical procedures, infections, or chronic pathological conditions such as diabetes mellitus and vascular disorders, which often impair the healing process and increase the risk of complications [2].
Wound healing is a highly coordinated biological process involving four overlapping phases: hemostasis,

inflammation, proliferation, and remodeling. During these phases, various cell types including platelets, neutrophils, macrophages, fibroblasts, and keratinocytes interact with cytokines, growth factors, and extracellular matrix components to restore damaged tissue [4]. However, factors such as microbial infection, oxidative stress, poor nutrition, aging, and systemic diseases may delay tissue repair and lead to chronic wounds [2,3]. Chronic wounds such as diabetic ulcers, pressure ulcers, and venous leg ulcers represent a major healthcare burden because they require prolonged treatment and are frequently associated with severe complications including infection and tissue necrosis [5].

Conventional wound management commonly involves the use of antibiotics, antiseptics, anti-inflammatory agents, and modern wound dressings to prevent infection and promote tissue regeneration. Although these therapies are widely used, they are often associated with limitations including adverse effects, antimicrobial resistance, delayed healing, and high treatment costs [6,7]. These limitations have increasing interest in alternative therapeutic approaches derived from medicinal plants and natural products [8].

Medicinal plants have been traditionally used for centuries in systems such as Ayurveda, Unani, and Traditional Chinese Medicine for the treatment of wounds, burns, and skin infections [9]. Plant-derived phytochemicals including flavonoids, tannins, alkaloids, terpenoids, and phenolic compounds possess antioxidant, anti-inflammatory, antimicrobial, and collagen-promoting activities that contribute significantly to tissue repair and regeneration [8,10]. Antioxidants present in medicinal plants help neutralize reactive oxygen species generated during inflammation, thereby reducing oxidative stress and promoting faster wound healing [10,11].

Among medicinal plants, Mimosa tenuiflora has attracted scientific attention belonging to the family Fabaceae and its traditional use in the treatment of skin injuries, burns, ulcers, and infections[13]. Previous studies have reported that the plant contains bioactive compounds such as tannins, flavonoids, and phenolic constituents that exhibit antioxidant, antimicrobial, and anti-inflammatory properties [12, 14]. Due to these pharmacological properties, Mimosa tenuiflora has gained scientific attention for its potential role in wound healing and tissue regeneration [15].

However, despite its traditional medicinal significance, comprehensive scientific evaluation of its wound healing potential using validated experimental models remains limited.

Therefore, the present study aims to evaluate the wound healing potential of Mimosa tenuiflora using the excision wound model in Wistar rats. The study may provide scientific validation for the traditional use of this medicinal plant and contribute toward the development of safer and more effective plant-based therapies for wound management.

2. MATERIAL AND METHODS:

Materials:

Chemicals and Drugs

Mimosa tenuiflora, petroleum ether, chloroform, ethyl acetate, methanol, distilled water, Dragendorff's reagent, Mayer's reagent, Wagner's reagent, ferric chloride solution, and standard wound healing drug were used in the study.

Instruments and Equipment

Soxhlet extraction apparatus, rotary vacuum evaporator, mechanical grinder, analytical balance, hot air oven, water bath, glassware, surgical instruments, and Vernier caliper/transparent graph paper were used for extraction and evaluation studies.

Methods:

Collection and Authentication of Plant Material

Plant Part: Bark of *Mimosa tenuiflora*
Site of Collection: Local herbal garden, Pune, Maharashtra, India
Authentication by: Department of Botany, local authorized institute

Extraction Method

The collected bark of Mimosa tenuiflora was washed thoroughly with distilled water, shade dried, powdered, and subjected to successive Soxhlet extraction using petroleum ether, chloroform, ethyl acetate, and methanol [16]. The obtained extracts were concentrated under reduced pressure using a rotary vacuum evaporator and labeled as

PEMT, CMT, EAMT, and MEMT respectively. The dried extracts were stored in airtight containers at 4°C for further phytochemical and pharmacological studies [16].

Physicochemical Evaluation
Physicochemical evaluation of Mimosa tenuiflora bark was carried out according to WHO guidelines. Parameters such as total ash, acid-insoluble ash, water-soluble ash, extractive values, and loss on drying were determined to assess the purity and quality of the crude drug [17].

Evaluation of Ash Values
Ash values including total ash, acid-insoluble ash, and water-soluble ash were determined using standard procedures to evaluate inorganic content and possible contamination of the crude drug [17,18].

Loss on Drying
Loss on drying was determined by drying the powdered crude drug at 105°C until constant weight was obtained. The percentage loss in weight was calculated to determine the moisture content of the sample [17].

Extractive Values
Water-soluble and alcohol-soluble extractive values of Mimosa tenuiflora bark were determined using standard maceration methods to evaluate the presence of water-soluble and alcohol-soluble phytoconstituents in the crude drug [19].

Fluorescence Analysis
Fluorescence analysis of powdered Mimosa tenuiflora bark was carried out under visible and ultraviolet light after treatment with different chemical reagents. The study was performed for identification and authentication of the crude drug [17].

Qualitative Phytochemical Screening
Qualitative phytochemical screening of Mimosa tenuiflora extracts was carried out using standard procedures to detect the presence of alkaloids, glycosides, flavonoids, carbohydrates, proteins, phenolic compounds, tannins, steroids, terpenoids, and saponins [17,18].

Alkaloids were identified by Wagner's, Dragendorff's, Hager's, and Mayer's tests. Glycosides were detected using Keller–Killiani, Borntrager's, and Ninhydrin tests. Proteins and carbohydrates were identified by Biuret, Fehling's, Benedict's tests. Phenolic compounds and tannins were detected using ferric chloride and potassium ferricyanide tests, while flavonoids were confirmed by Shinoda's test. Steroids and terpenoids were identified by Libermann Burchard and Salkowski tests. Saponins were detected by froth and foam tests [17].

Thin Layer Chromatography (TLC) Analysis
Thin layer chromatography of PEMT, CMT, EAMT, and MEMT extracts was performed using pre-coated silica gel 60 F_{254} plates as stationary phase [20]. Different solvent systems were optimized for proper separation of phytoconstituents [20,21]. The samples were spotted on TLC plates, developed in saturated chambers, and visualized under UV light at 254 nm and 366 nm. Rf values of the separated spots were calculated and recorded [22].

In vitro Antioxidant Assay of Mimosa tenuiflora:
I. DPPH Assay
Different concentrations of Mimosa tenuiflora extracts were mixed with DPPH solution and incubated in dark for 30 minutes. Absorbance was measured at 517 nm, and percentage inhibition along with IC_{50} values was calculated [23].

II. Hydrogen Peroxide Scavenging Assay
Different concentrations of extracts were mixed with hydrogen peroxide solution in phosphate buffer (pH 7.4). After 10 minutes, absorbance was measured at 230 nm to determine hydrogen peroxide scavenging activity [24].

III. Superoxide Radical Scavenging Assay

Extracts were mixed with NADH, nitroblue tetrazolium, and PMS solution. After incubation for 5 minutes at 25°C, absorbance was recorded at 560 nm and percentage inhibition was calculated [27].

IV. Reducing Power Assay
Different concentrations of extracts were mixed with phosphate buffer and potassium ferricyanide, followed by incubation at 50°C for 20 minutes. After addition of trichloroacetic acid and ferric chloride, absorbance was measured at 700 nm [26].

V. Quantitative Analysis
Total phenolic, flavonoid, alkaloid, and saponin contents of the extracts were estimated using standard spectrophotometric methods [27,28,29].

Selection of Extract for *In vivo Study*
Based on the results of preliminary phytochemical screening, TLC analysis, total phenolic and flavonoid content, and in vitro antioxidant assays, the methanolic extract of Mimosa tenuiflora (MEMT) exhibited the highest antioxidant activity and phytochemical content. Therefore, MEMT was selected for further in vivo wound healing evaluation using the excision wound model in Wistar rats.

In vivo Study:
I. Ethical Approval and Experimental Animals
Healthy adult Wistar rats (180–220 g) of either sex were used for the study. Animals were maintained under standard laboratory conditions with free access to food and water. The experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC) (Approval No.SCOP/IAEC/2025/08).

II. Preparation of Extract Formulation
Topical gel formulations of Mimosa tenuiflora extracts were prepared using Carbopol 940 as the gelling agent. The required quantity of extract was dissolved in propylene glycol and mixed with hydrated Carbopol dispersion. Triethanolamine was added for neutralization and gel formation. The final gel formulations containing 0.5% w/w extract were stored in airtight containers for further study.

III. Excision Wound Model
Excision wound model was used to evaluate wound healing activity. Rats were anesthetized, and a circular full-thickness wound of approximately 300–350 mm² was created on the dorsal region. The treatments were applied topically once daily until complete healing.

The wound area was measured on days 0, 3, 6, 9, 12, and 15, and percentage wound contraction was calculated. The period of epithelialization was also recorded [31].

Experimental Grouping:
Table 1: Experimental Grouping

Group	Treatment	Dose / Formulation	Route of Administration	No. of Animals
Group I	Normal Control	No treatment	-	6
Group II	Negative Control	Gel base	Topical	6
Group III	Standard	Megaheal gel	Topical	6
Group IV	MEMT	500 mg/kg	Topical	6
Group V	MEMT	1000 mg/kg	Topical	6
Group VI	MEMT	2000 mg/kg	Topical	6
Total animals required				36

Sample Collection:
At the end of the study, granulation tissue was collected from the wound area, homogenized, and centrifuged. The obtained supernatant was used for biochemical estimations.

Hydroxyproline Content:
Hydroxyproline content of granulation tissue was estimated to determine collagen formation during wound healing. The tissue hydrolysate was treated with chloramine-T and Ehrlich's reagent, and absorbance was measured at 557 nm. The results were expressed as µg/mg tissue [32].
Hexosamine Content:

Hexosamine estimation was carried out to evaluate glycosaminoglycan content in wound tissue. The tissue hydrolysate was treated with acetylacetone and Ehrlich's reagent, and absorbance was recorded at 530 nm [33].

Total Protein Content:
Total protein content of wound tissue homogenate was estimated by Lowry's method. Absorbance of the developed blue colored complex was measured at 660 nm, and results were expressed as mg/g tissue [34].

Superoxide Dismutase (SOD) Activity
SOD activity was determined based on inhibition of nitroblue tetrazolium reduction by superoxide radicals. Absorbance was measured at 560 nm and enzyme activity was expressed as units/mg protein [35].

Catalase (CAT) Activity
Catalase activity was estimated by measuring the decomposition of hydrogen peroxide spectrophotometrically at 240 nm. Results were expressed as units/mg protein [36].

Reduced Glutathione (GSH) Level
Reduced glutathione level was estimated using Ellman's reagent (DTNB). The yellow colored complex formed was measured at 412 nm and expressed as µg/mg tissue [37].

Histopathological Examination
Wound tissue samples were fixed in 10% formalin, processed, embedded in paraffin wax, sectioned, and stained with hematoxylin and eosin. The sections were examined microscopically for collagen deposition, fibroblast proliferation, angiogenesis, inflammatory cell infiltration, and re-epithelialization [38].

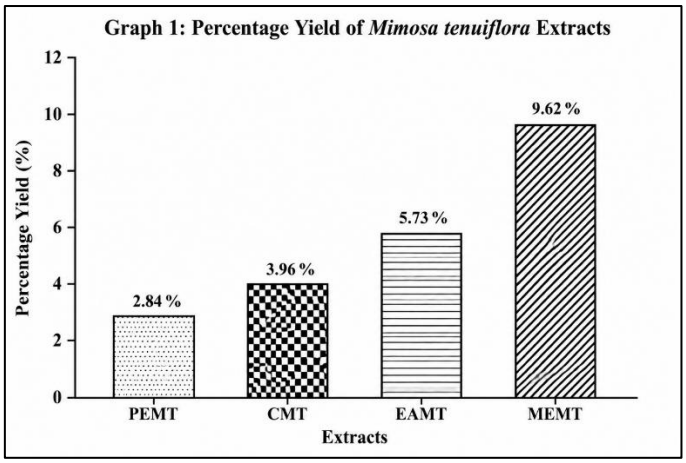
Statistical Analysis
The results were expressed as mean ± SEM (n = 5). Statistical analysis was performed using one-way ANOVA followed by Dunnett's multiple comparison test using GraphPad Prism software. A value of $p < 0.05$ was considered statistically significant [39].

3. RESULTS:

Percentage Yield of *Mimosa tenuiflora* Extracts

Table 2: Percentage Yield of *Mimosa tenuiflora* Extracts

Extract	Solvent Used	Percentage Yield (%)	Physical Appearance
PEMT	Petroleum ether	2.84 %	Yellowish semi-solid
CMT	Chloroform	3.96 %	Brown semi-solid
EAMT	Ethyl acetate	5.73 %	Dark brown extract
MEMT	Methanol	9.62 %	Dark brown sticky mass



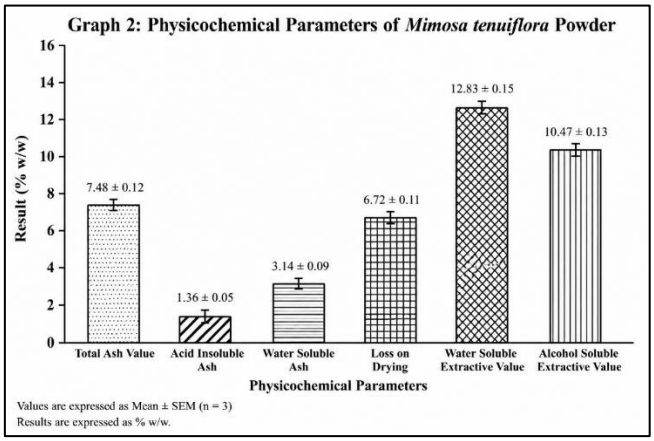
Graph 1: Percentage Yield of *Mimosa tenuiflora* Extracts

Physicochemical Parameters of *Mimosa tenuiflora* Powder

Table 3: Physicochemical Parameters of *Mimosa tenuiflora* Powder

Sr. No.	Parameter	Result (% w/w)
1	Total Ash Value	7.48 ± 0.12
2	Acid Insoluble Ash	1.36 ± 0.05
3	Water Soluble Ash	3.14 ± 0.09
4	Loss on Drying	6.72 ± 0.11
5	Water Soluble Extractive Value	12.83 ± 0.15
6	Alcohol Soluble Extractive Value	10.47 ± 0.13

Values are expressed as Mean ± SEM (n = 3)



Graph 2: Physicochemical Parameters of *Mimosa tenuiflora* Powder

Ash Values of *Mimosa tenuiflora* Bark Powder

Table 4: Ash Values of *Mimosa tenuiflora* Bark Powder

Sr. No.	Parameter	Result (% w/w)
1	Total Ash Value	7.48 ± 0.12
2	Acid Insoluble Ash	1.36 ± 0.05
3	Water Soluble Ash	3.14 ± 0.09

Values are expressed as Mean ± SEM (n = 3).

Loss on Drying of *Mimosa tenuiflora* Bark Powder

Table 5: Loss on Drying of *Mimosa tenuiflora* Bark Powder

Sr. No.	Parameter	Result (% w/w)
1	Loss on Drying	6.72 ± 0.11

Values are expressed as Mean ± SEM (n = 3).

Extractive Values of *Mimosa tenuiflora* Bark Powder

Table 6: Extractive Values of *Mimosa tenuiflora* Bark Powder

Sr. No.	Parameter	Result (% w/w)
1	Water Soluble Extractive Value	12.83 ± 0.15
2	Alcohol Soluble Extractive Value	10.47 ± 0.13

Values are expressed as Mean ± SEM (n = 3).

Fluorescence Analysis of *Mimosa tenuiflora* Bark Powder

Table 7: Fluorescence Analysis of *Mimosa tenuiflora* Bark Powder

Sr. No.	Treatment with Reagent	Daylight	UV Light (254 nm)	UV Light (366 nm)
1	Powder as such	Brown	Dark brown	Greenish brown
2	Powder + Distilled water	Light brown	Dark green	Green
3	Powder + 1N HCl	Reddish brown	Dark brown	Orange brown
4	Powder + 1N NaOH	Dark brown	Green	Yellowish green
5	Powder + Methanol	Brown	Greenish brown	Light green
6	Powder + Ethanol	Brown	Dark green	Yellowish green
7	Powder + Chloroform	Dark brown	Green	Light green
8	Powder + Acetic acid	Brown	Dark brown	Greenish brown

Preliminary Phytochemical Screening of *Mimosa tenuiflora* Extracts

Table 8: Preliminary Phytochemical Screening of *Mimosa tenuiflora* Extracts

Phytochemical Constituents	PEMT	CMT	EAMT	MEMT
Alkaloids	–	+	+	+
Glycosides	–	+	+	+
Flavonoids	–	+	+	+
Tannins	–	–	+	+
Phenolic Compounds	–	+	+	+
Saponins	–	–	+	+
Steroids	+	+	–	–
Terpenoids	+	+	–	–
Carbohydrates	–	+	+	+
Proteins	–	–	–	–

(+): Present (–): Absent

TLC of Different Extracts of *Mimosa tenuiflora*

Table 9: Rf Values of Different Extracts of *Mimosa tenuiflora*

Extract	Mobile Phase	No. of Spots	Rf Values
PEMT	Hexane: Ethyl acetate (8:2)	3	0.21, 0.46, 0.73
CMT	Hexane: Ethyl acetate (6:4)	3	0.18, 0.41, 0.68
EAMT	Chloroform: Methanol (9:1)	4	0.16, 0.34, 0.52, 0.79
MEMT	Ethyl acetate: Methanol: Water (100:13.5:10)	4	0.12, 0.29, 0.47, 0.71

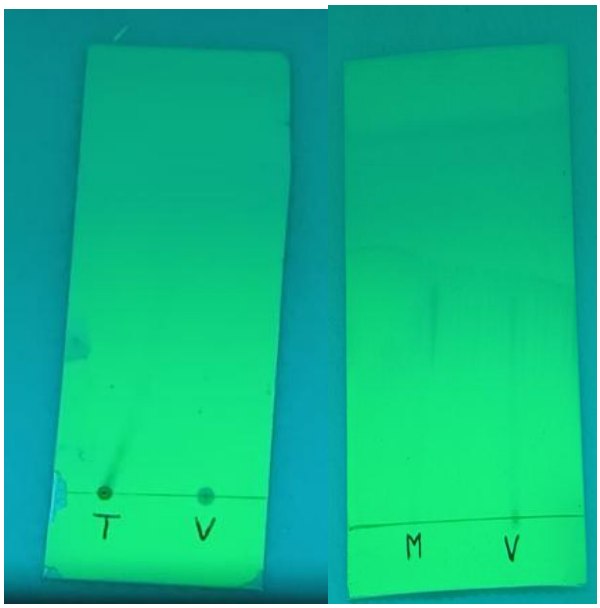


Figure 1: TLC
Where,
T =PEMT, A= CMT, M= EAMT, V=MEMT

In-vitro Antioxidant Activity of *Mimosa tenuiflora* Extracts

1. DPPH Assay

Table 10: DPPH Radical Scavenging Activity of Mimosa tenuiflora Extracts

Concentration (µg/mL)	PEMT (%)	CMT (%)	EAMT (%)	MEMT (%)	Ascorbic Acid (%)
20	18.6	24.1	31.4	36.2	48.5
40	25.3	32.8	44.7	51.9	63.4
60	34.9	41.5	56.2	64.3	75.8
80	42.7	49.8	67.4	74.6	86.1
100	51.3	57.6	74.8	82.5	92.4

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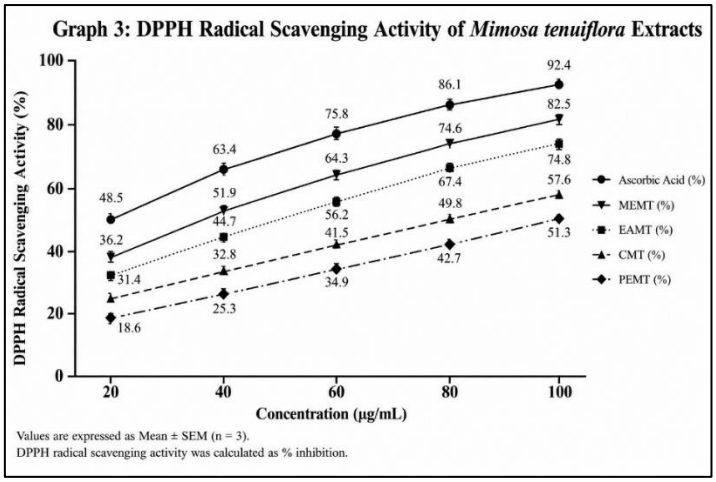


Graph 3: DPPH Radical Scavenging Activity of *Mimosa tenuiflora* Extracts

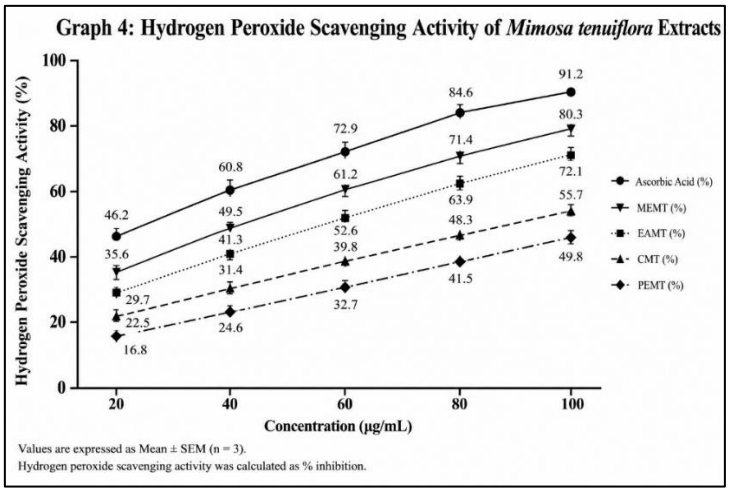
IC_{50} Values

Sample	IC_{50} (µg/mL)
PEMT	92.4
CMT	78.6
EAMT	61.3
MEMT	48.7
Ascorbic Acid	32.5

2. Hydrogen Peroxide Scavenging Assay

Table 11: Hydrogen Peroxide Scavenging Activity of *Mimosa tenuiflora* Extracts

Concentration (µg/mL)	PEMT (%)	CMT (%)	EAMT (%)	MEMT (%)	Ascorbic Acid (%)
20	16.8	22.5	29.7	35.6	46.2
40	24.6	31.4	41.3	49.5	60.8
60	32.7	39.8	52.6	61.2	72.9
80	41.5	48.3	63.9	71.4	84.6
100	49.8	55.7	72.1	80.3	91.2



Graph 4: Hydrogen Peroxide Scavenging Activity of *Mimosa tenuiflora* Extracts

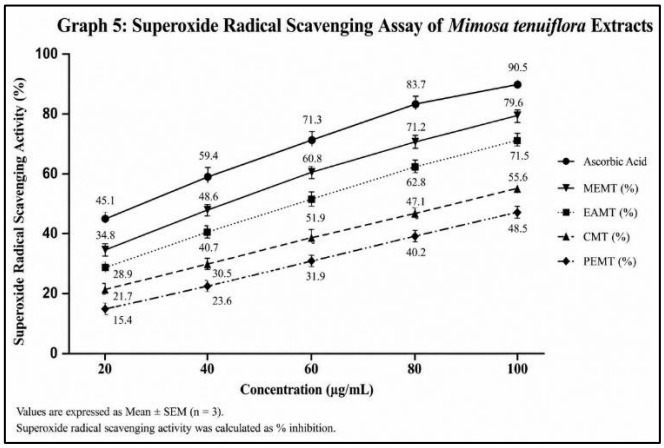
IC_{50} Values

Sample	IC_{50} (µg/mL)
PEMT	95.6
CMT	82.4
EAMT	66.8
MEMT	52.1
Ascorbic Acid	35.4

3. Superoxide Radical Scavenging Assay

Table 12: Superoxide Radical Scavenging Activity of *Mimosa tenuiflora* Extracts

Concentration (µg/mL)	PEMT (%)	CMT (%)	EAMT (%)	MEMT (%)	Ascorbic Acid (%)
20	15.4	21.7	28.9	34.8	45.1
40	23.6	30.5	40.7	48.6	59.4
60	31.9	38.8	51.9	60.8	71.3
80	40.2	47.1	62.8	71.2	83.7
100	48.5	55.6	71.5	79.6	90.5



Graph 5: Superoxide Radical Scavenging Activity of *Mimosa tenuiflora* Extracts

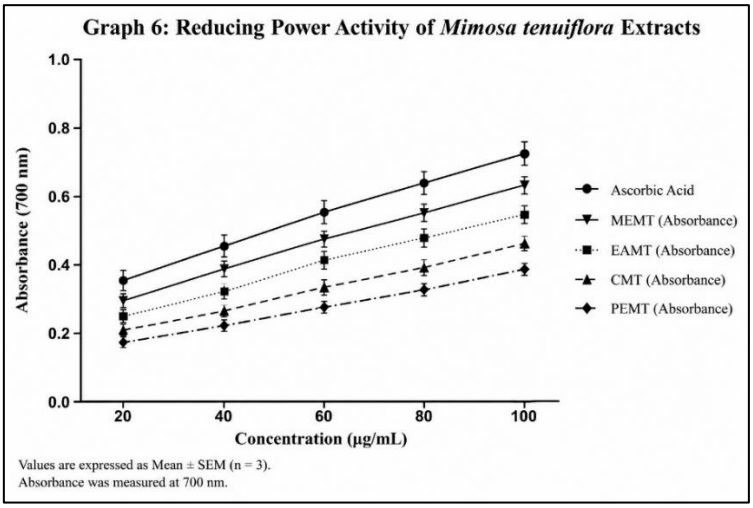
IC_{50} Values

Sample	IC_{50} (µg/mL)
PEMT	98.3
CMT	84.7
EAMT	68.5
MEMT	54.2
Ascorbic Acid	36.8

4. Reducing Power Assay

Table 13: Reducing Power Activity of *Mimosa tenuiflora* Extracts

Concentration (µg/mL)	PEMT (Absorbance)	CMT (Absorbance)	EAMT (Absorbance)	MEMT (Absorbance)	Ascorbic Acid (Absorbance)
20	0.182	0.214	0.265	0.298	0.362
40	0.235	0.278	0.341	0.396	0.458
60	0.298	0.347	0.426	0.482	0.556
80	0.352	0.401	0.495	0.562	0.642
100	0.418	0.469	0.574	0.638	0.731



Graph 6: Reducing Power Activity of *Mimosa tenuiflora* Extracts

Total Phenolic Content

Table 14: Total Phenolic Content of Mimosa tenuiflora Extracts

Extract	Total Phenolic Content (mg GAE/g extract)
EAMT	62.48 ± 1.72
MEMT	78.96 ± 2.15

Values are expressed as Mean ± SEM (n = 3).

Total Flavonoid Content

Table 15: Total Flavonoid Content of Mimosa tenuiflora Extracts

Extract	Total Flavonoid Content (mg QE/g extract)
EAMT	48.72 ± 1.38
MEMT	65.41 ± 1.96

Values are expressed as Mean ± SEM (n = 3).

Total Alkaloid Content

Table 16: Total Alkaloid Content of Mimosa tenuiflora Extracts

Extract	Total Alkaloid Content (mg AE/g extract)
EAMT	28.64 ± 0.94
MEMT	34.87 ± 1.12

Values are expressed as Mean ± SEM (n = 3).

Total Saponin Content

Table 17: Total Saponin Content of Mimosa tenuiflora Extracts

Extract	Total Saponin Content (mg DE/g extract)
EAMT	36.58 ± 1.21
MEMT	49.73 ± 1.64

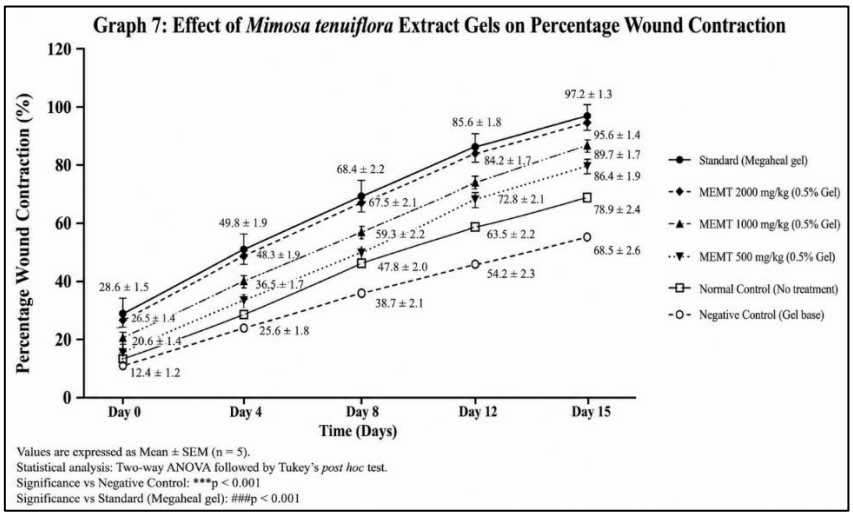
Values are expressed as Mean ± SEM (n = 3).

In-vivo study

Excision Wound Healing Activity

Table 18: Effect of *Mimosa tenuiflora* Extract Gels on Percentage Wound Contraction

Group	Treatment	Day 0 (%)	Day 4 (%)	Day 8 (%)	Day 12 (%)	Day 15 (%)
Normal Control	No treatment	15.6 ± 1.3	31.4 ± 1.7	47.8 ± 2.0	63.5 ± 2.2	78.9 ± 2.4
Negative Control	Gel base	12.4 ± 1.2	25.6 ± 1.8	38.7 ± 2.1	54.2 ± 2.3	68.5 ± 2.6
Standard	Megaheal gel	28.6 ± 1.5	49.8 ± 1.9	68.4 ± 2.2	85.6 ± 1.8	97.2 ± 1.3
MEMT 500 mg/kg	0.5% Gel	18.3 ± 1.3	36.5 ± 1.7	54.2 ± 2.0	72.8 ± 2.1	86.4 ± 1.9
MEMT 1000 mg/kg	0.5% Gel	20.6 ± 1.4	40.7 ± 1.8	59.3 ± 2.2	76.5 ± 2.0	89.7 ± 1.7
MEMT 2000 mg/kg	0.5% Gel	26.5 ± 1.4	48.3 ± 1.9	67.5 ± 2.1	84.2 ± 1.7	95.6 ± 1.4



Graph 7: Effect of *Mimosa tenuiflora* Extract Gels on Percentage Wound Contraction

Biochemical Parameters of Wound Tissue

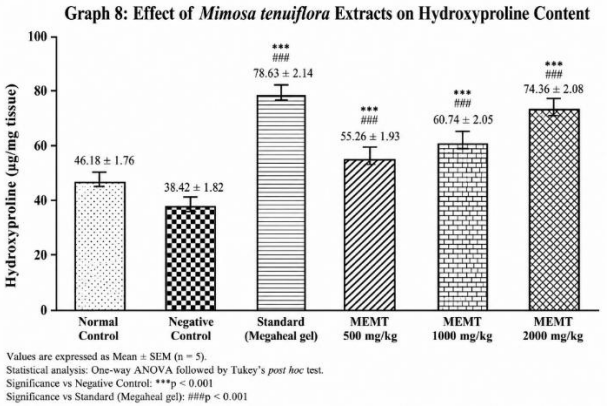
Hydroxyproline Content

Table 19: Effect of *Mimosa tenuiflora* Extracts on Hydroxyproline Content

Group	Treatment	Hydroxyproline (µg/mg tissue)
Normal Control	No Treatment	46.18 ± 1.76
Negative Control	Gel base	38.42 ± 1.82
Standard	Megaheal gel	78.63 ± 2.14
MEMT 500 mg/kg	0.5% Gel	55.26 ± 1.93

MEMT 1000 mg/kg	0.5% Gel	60.74 ± 2.05
MEMT 2000 mg/kg	0.5% Gel	74.36 ± 2.08

Values are expressed as Mean ± SEM (n = 5).



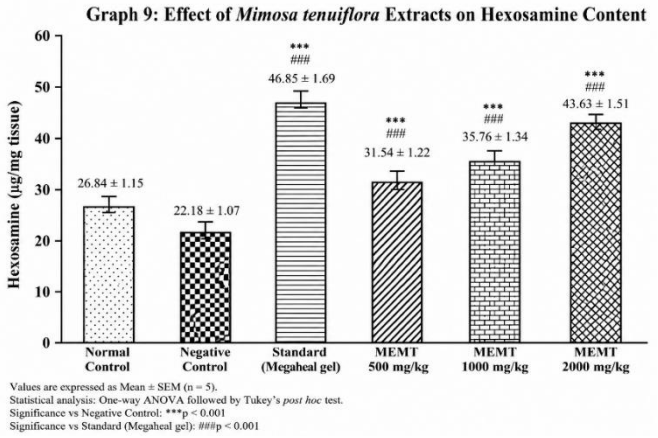
Graph 8: Effect of *Mimosa tenuiflora* Extracts on Hydroxyproline Content

Hexosamine Content

Table 20: Effect of *Mimosa tenuiflora* Extracts on Hexosamine Content

Group	Treatment	Hexosamine (µg/mg tissue)
Normal Control	No Treatment	26.84 ± 1.15
Negative Control	Gel base	22.18 ± 1.07
Standard	Megaheal gel	46.85 ± 1.69
MEMT 500 mg/kg	0.5% Gel	31.54 ± 1.22
MEMT 1000 mg/kg	0.5% Gel	35.76 ± 1.34
MEMT 2000 mg/kg	0.5% Gel	43.63 ± 1.51

Values are expressed as Mean ± SEM (n = 5).



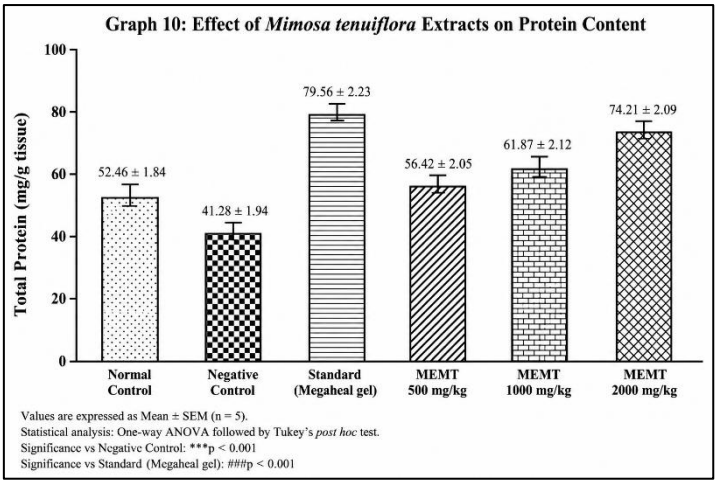
Graph 9: Effect of *Mimosa tenuiflora* Extracts on Hexosamine Content

Total Protein Content

Table 21: Effect of *Mimosa tenuiflora* Extracts on Protein Content

Group	Treatment	Total Protein (mg/g tissue)
Normal Control	No Treatment	52.46 ± 1.84
Negative Control	Gel base	41.28 ± 1.94
Standard	Megaheal gel	79.56 ± 2.23
MEMT 500 mg/kg	0.5% Gel	56.42 ± 2.05
MEMT 1000 mg/kg	0.5% Gel	61.87 ± 2.12
MEMT 2000 mg/kg	0.5% Gel	74.21 ± 2.09

Values are expressed as Mean ± SEM (n = 5).



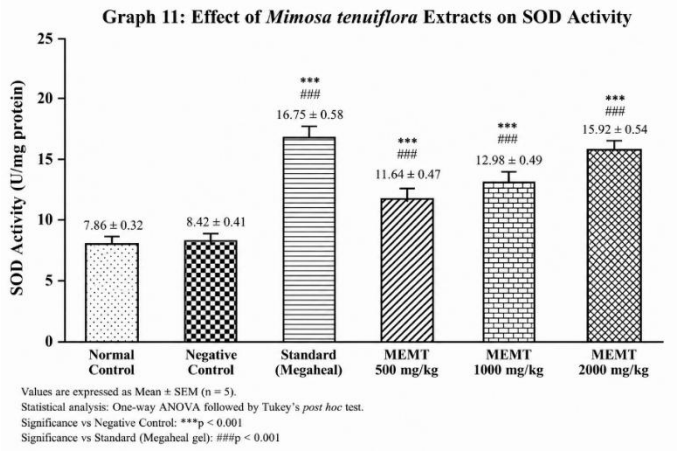
Graph 10: Effect of *Mimosa tenuiflora* Extracts on Protein Content

Superoxide Dismutase (SOD)

Table 22: Effect of *Mimosa tenuiflora* Extracts on SOD Activity

Group	Treatment	SOD (U/mg protein)
Normal Control	No Treatment	7.86 ± 0.32
Negative Control	Gel base	8.42 ± 0.41
Standard	Megaheal gel	16.75 ± 0.58
MEMT 500 mg/kg	0.5% Gel	11.64 ± 0.47
MEMT 1000 mg/kg	0.5% Gel	12.98 ± 0.49
MEMT 2000 mg/kg	0.5% Gel	15.92 ± 0.54

Values are expressed as Mean ± SEM (n = 5).



Graph 11: Effect of *Mimosa tenuiflora* Extracts on SOD Activity

Catalase Activity

Table 23: Effect of *Mimosa tenuiflora* Extracts on Catalase Activity

Group	Treatment	Catalase (U/mg protein)
Normal Control	No Treatment	42.36 ± 1.32
Negative Control	Gel base	21.45 ± 1.12
Standard	Megaheal gel	45.63 ± 1.58
MEMT 500 mg/kg	0.5% Gel	30.74 ± 1.29
MEMT 1000 mg/kg	0.5% Gel	34.68 ± 1.37
MEMT 2000 mg/kg	0.5% Gel	42.16 ± 1.46

Values are expressed as Mean ± SEM (n = 5).

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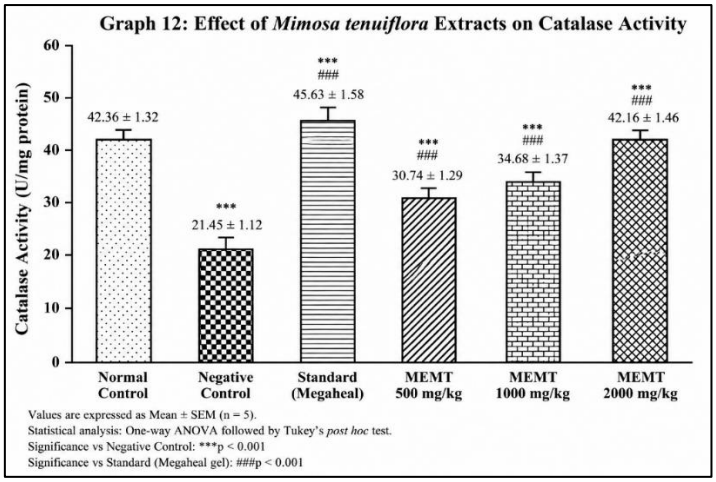


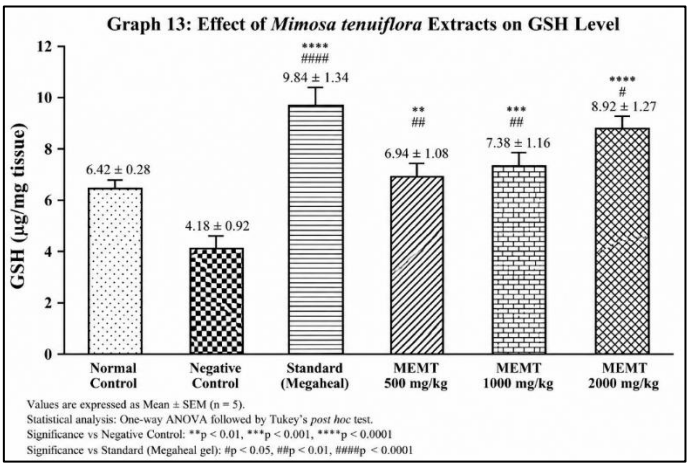
Graph 12: Effect of *Mimosa tenuiflora* Extracts on Catalase Activity

Reduced Glutathione (GSH)

Table 24: Effect of *Mimosa tenuiflora* Extracts on GSH Level

Group	Treatment	GSH (µg/mg tissue)
Normal Control	No Treatment	6.42± 0.28
Negative Control	Gel base	4.18 ± 0.92
Standard	Megaheal gel	9.84 ± 1.34
MEMT 500 mg/kg	0.5% Gel	6.94 ± 1.08
MEMT 1000 mg/kg	0.5% Gel	7.38 ± 1.16
MEMT 2000 mg/kg	0.5% Gel	8.92 ± 1.27

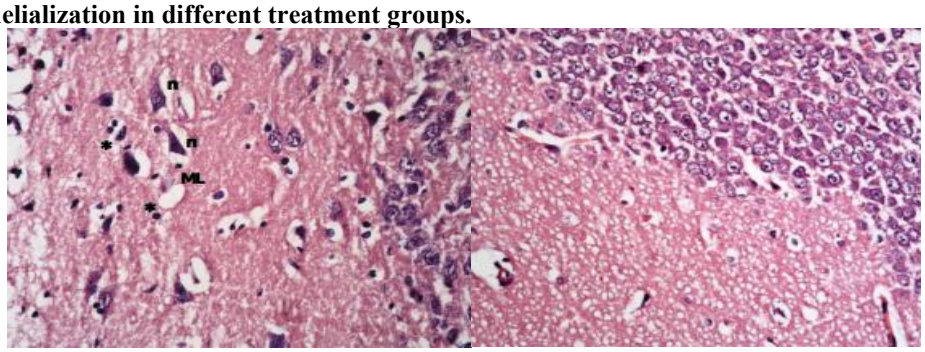
Values are expressed as Mean ± SEM (n = 5).



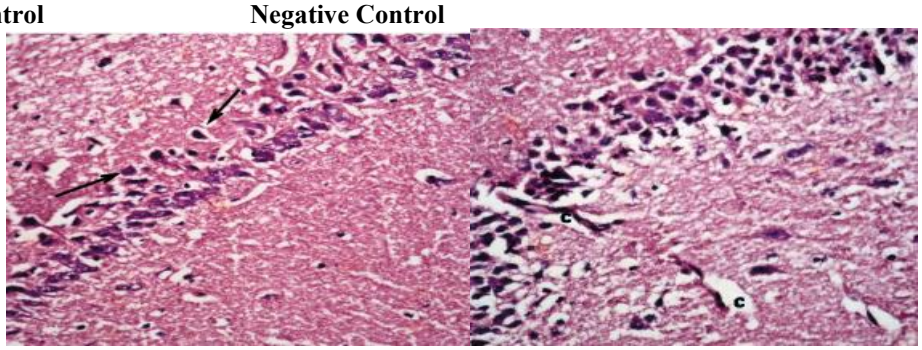
Graph 13: Effect of *Mimosa tenuiflora* Extracts on GSH Level

Histopathological Evaluation of Wound Tissue:

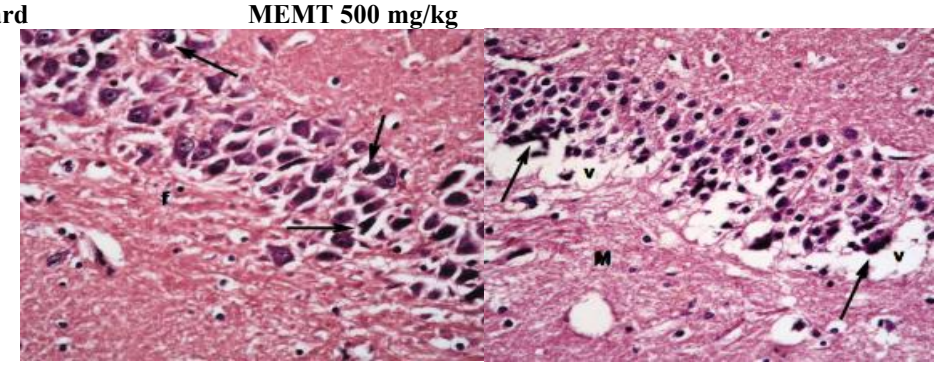
Figure 1: Histopathological evaluation of wound tissue showing collagen deposition, fibroblast proliferation and re-epithelialization in different treatment groups.



Normal Control **Negative Control**



Standard **MEMT 500 mg/kg**



MEMT 1000 mg/kg **MEMT 2000 mg/kg**

4. DISCUSSION:

The present study demonstrated the significant wound healing potential of Mimosa tenuiflora bark extracts in the excision wound model in Wistar rats. Among the different solvent extracts evaluated, the methanolic extract (MEMT) exhibited superior antioxidant and wound healing activity, which may be attributed to the higher concentration of bioactive phytoconstituents such as flavonoids, tannins, phenolic compounds, alkaloids, and saponins. Based on the phytochemical screening, TLC analysis and in vitro antioxidant studies, MEMT was selected for further in vivo wound healing evaluation.

The in vitro antioxidant studies revealed that MEMT showed remarkable free radical scavenging activity in DPPH, hydrogen peroxide, and superoxide radical scavenging assays with comparatively lower IC_{50} values. Increased reducing power activity and elevated phenolic and flavonoid content further support the strong antioxidant potential of the extract. Oxidative stress plays a major role in delayed wound healing by damaging cellular structures and prolonging inflammation. Therefore, the antioxidant activity of MEMT may contribute significantly to accelerated tissue repair.

In the excision wound model, topical application of MEMT gel produced a marked increase in percentage wound contraction and faster epithelialization compared to the control group. The MEMT 2000 mg/kg treated group showed wound healing activity almost comparable to the standard Megaheal gel. Biochemical estimations demonstrated increased hydroxyproline, hexosamine, total protein, SOD, catalase, and GSH levels, indicating enhanced collagen synthesis, extracellular matrix formation, and improved antioxidant defense mechanisms during wound repair.

Histopathological evaluation further confirmed enhanced fibroblast proliferation, collagen deposition, angiogenesis, and re-epithelialization in MEMT-treated groups with reduced inflammatory cell infiltration. These findings collectively suggest that Mimosa tenuiflora possesses potent wound healing activity mediated through antioxidant, anti-inflammatory, and tissue regenerative mechanisms. The study scientifically validates the traditional use of Mimosa tenuiflora in the management of wounds and skin disorders.

5. CONCLUSION:

The present study demonstrated that *Mimosa tenuiflora* possesses significant wound healing activity in the excision wound model in Wistar rats. The plant extract formulation showed enhanced wound contraction, reduced

epithelialization period, and improved rate of wound closure compared to the control group. These effects may be attributed to the presence of bioactive phytoconstituents such as flavonoids, tannins, and phenolic compounds. The extract exhibited antioxidant, antimicrobial, and anti-inflammatory properties, which play a crucial role in tissue regeneration and repair. The findings support the traditional use of *Mimosa tenuiflora* in the treatment of wounds and skin disorders. Overall, the study indicates that the plant extract is effective and safe for topical application. Further studies are recommended to isolate active compounds and understand the exact mechanism of action.

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