Assessing the Root of *Mimosa Pudica* for Wound Healing

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Abstract:

The primary goal of this investigation is to apply rational methods to handle the differentiation of the active components and pharmacological properties of the shoot and root extracts of *Mimosa pudica* Linn. The methanolic extracts of the shoots and roots of *Mimosa pudica* demonstrated exceptional wound healing efficacy when compared to the widely used medication Gentamicin. However, the *Mimosa pudica* root Chloroform Extract yielded some unsettling results (MRCE). We used UV and IR spectroscopy to illustrate the isolated mixes. In an ongoing report, the genuine potential of this ethanolic extract of *Mimosa pudica* Linn. leaves as a wound treatment was examined. The plant belongs to the Mimisace family as an individual. An ethanol extract of *Mimosa pudica* leaves was tested for its ability to heal wounds in rodents using consumption and extraction wound models. Compared to the benchmark group's 28% wound region, the extract-treated animals displayed a 73% decrease in wound region with the 5%w/w detailing and a 92% decline with the 10%w/w definition. In comparison to the control wounds, the extract-treated wounds in the extraction model exhibited quicker epithelialization and narrowing. This was confirmed by the results of the histological review. Researchers discovered that the greater the use of natural extracts, the more often wound constrictions occurred. The highest quality level found in the two assortments is mupirocin. *Mimosa pudica* has a remarkable effect on diabetic rodents' wound healing; further research on this benefit in humans is advised.

Keywords: *Mimosa pudica*, wound healing activity, MSME, MRM

1. INTRODUCTION

A mimosa shrub the delicate linn plant found in Brazil and India that is an individual from the Leguminoceae family. Mimosa pudica is prestigious for developing rapidly. The plant shows an extraordinary development known as NYCTYNASTIC development, in which the whole leaf hangs descending and the handouts overlay together at night. At

daylight, it returns. Because of extra upgrades like contacting, intensity, or shaking, the leaves additionally contract. Also, the hedges could spread to local leaves. We allude to this sort of development as SEISMONASTIC development. Previously, a few restorative plants were utilized to treat diseases. They were a compelling instrument for changing numerous clinical circumstances. Many societies and civilizations have abandoned a rich tradition of information and expertise in natural medication in our country. The point of the plant work is to research the pharmacological activities of the plant in concentrates of the shoots and underlying foundations of Mimosa pudica, as well as to recognize the dynamic part utilizing logical techniques[1].

Figure 1: Mimosa pudica

The biochemical and cell systems engaged with wound mending are efficient and bring about the turn of events and recovery of harmed tissue in a one-of-a-kind way. Wound mending is an imperative natural cycle that incorporates tissue recovery and fixes. The harmed skin or tissue is at last reestablished to its normal state by the activity of an intricate organization of platelets, cytokines, and development factors. The objective of wound care is to support twisted mending as fast as doable while causing the patient as little aggravation, uneasiness, or scarring as could be expected. This recuperating system likewise needs to happen in a physiological setting that supports tissue recovery and fix. Contingent upon the cosmetics of the fixed injuries' edges, wound mending might be flawlessly separated into three classes: recuperating by first aim, recuperating by second aim, and recuperating by third aim. up contrast, wounds fixed by second goal involve the creation of granulation tissues, which occupy the spaces between the injury edges and are connected with impressive tissue misfortune, leaving negligible scars. Wounds recuperated by first goal mend without a hitch, leaving no scars. At the point when an injury recuperates by a third expectation, it frequently requires three to five days for the granulation bed to implode before it is stitched, abandoning an enormous scar. Moreover, four remarkable periods of wound recuperating — the provocative, debridement, expansion, and rebuilding/development processes — have been found. It is very much perceived that various factors, including diseases, dietary state, prescriptions, chemicals, the sort and areas of wounds, and squandering problems like diabetes, can influence how rapidly wounds recuperate. Therapeutic spices have been used widely and with extraordinary accomplishment to advance injury mending in society medication. This has started a plenty of studies that try to confirm the statements and recognize likely systems behind these spices' capacity to support wound mending.

2. REVIEW OF LITERATURE

Singh, S, et al. (2021) inspected that Mimosa pudica Linn, a perpetual spice, is referred to for its legends claims as a cell

reinforcement, antibacterial, and wound-mending specialist. The plant's foundations were separated utilizing hexane, ethyl acetic acid derivation, and methanol. The methanolic extricate showed a most extreme impact of 73.43% against standard ascorbic corrosive, yet showed unfortunate cell reinforcement viability. The methanolic concentrate of the minimum inhibitory fixation for Salmonella typhi-MTCC15442 and Escherichia coli-MTCC118 was more than 2.5 mg/ml. The methanolic remove contained flavonoids, which were affirmed through range examination. The root concentrate of Mimosa pudica has potential as a cancer prevention agent, antibacterial, and wound healer when utilized in skin medicine organization[2].

Kumar, V. (2021) identified that Mimosa pudica Linn, a conventional clinical spice in America, Africa, Korea, China, and India, has been utilized for quite a long time to treat different sicknesses. Its ethno-therapeutic purposes, phytochemistry, pharmacology, and toxicology were assembled from 1990 to 2020. Forty synthetic mixtures, including flavonoids, phenols, and alkaloids, have been recognized. The rough concentrates and confines have shown different pharmacological activities, including hostile to malignant growth, calming, osteoporosis, neurological sicknesses, and hypertension. Logical techniques like HPLC and HPTLC have exhibited their viability in evaluating the plant and its definitions. Future examination ought to zero in on the phytochemicals' systems and harmfulness studies to guarantee safe utilization of the plant and its arrangements.

Bodhankar, S. S et al. (2023) analyzed that Mimosa pudica Linn, a perennial herb from the Leguminoceae family, is known for its antioxidant, antibacterial, and wound-healing properties. The plant's roots were extracted using was to evaluate its folkloric assertions using hexane, ethyl acetate, and methanol. In terms of antioxidant effectiveness, the methanolic extract was only 73.43% effective when tested against standard ascorbic acid, according to its IC50. Microorganisms with MIC > 2.5 mg/ml were identified in the methanolic extract of Salmonella typhi-MTCC15442 and Escherichia coli-MTCC118. Mimosa pudica methanolic extract beat the market-accessible povidone-iodine ointment in wound healing. When applied topically, Mimosa pudica root might have antioxidant, antibacterial, and wound-healing properties, according to this review, which backs up the traditional case. Tannins and flavonoids are present in the plant's ethanolic extract; the research with the biggest zone of inhibition showed that it had antibacterial and moderating effects[3].

3. RESEARCH METHODOLOGY

3.1.Chemicals

Sodium nitroprusside, carboxymethylcellulose (CMC), methanol, ethanol, trichloroacetic destructive, sodium hydroxide, hydrochloric destructive, sodium chloride, n-butanol, potassium dihydrogen phosphate, dipotassium hydrogen phosphate, sodium carbonate, sodium bicarbonate, ethylenediaminetetraacetic destructive (EDTA), sulphonamide, phosphoric destructive, and potassium chloride were the materials acquired from Sigma Aldrich Manufactured Co., St. Louis, MO, USA.

3.2.Animal care and handling

The Indian Public Science Foundation and World Wellbeing Association's rules were observed for creature care and the executives. Solid male Swiss pale skinned person mice matured 6 two months were browsed an ingrained settlement. The mice were kept in a sanitized polypropylene confine with rice husk bedding. The Institutional Creature Morals Board of trustees of Mizoram College acknowledged the review.

3.3. Experimental protocol

As indicated by the data beneath, the profound dermal extraction twisted shaped on the dorsum of mice was utilized to survey the injury recuperating action of the ethanol concentrate of Lajjavati. A sum of 300 creatures were used to play out all tests.

3.4. Preparation of extract

Mimosa pudica, frequently known as lajwanti, is an individual from the plant family Fabaceae. It was found and completely examined by the Mizoram School's Division of Agriculture, Fragrant and Steady Plants in Aizawl, India. Entire, uncorrupted plants were gathered from the Mizoram School grounds among September and December. Following being washed, the plants were electrically ground into powder and shade dried. The powdered type of Mimosa pudica plant was extracted using a Soxhlet contraption and afterward cleaned with ethanol, water, chloroform, and oil ether. The ethanolic separate was dried and put away in the fridge for ensuing use. Later on, Mimosa pudica ethanol concentrate will be suggested as MPE[4].

The wound healing potential of lajwanti was performed by dividing the animals into the following groups: –

- **CMC group:** For six days, this collection of organisms was sublingually administered 0.5% CMC in turns.
- **MPE group:** The animals were given oral doses of MPE 50, 100, 150, and 200 mg/kg body weight for six consecutive days prior to the development of full thickness deep dermal extraction wounds.

3.4.1. Production of full–thickness skin wound

A full thickness profound dermal extraction entrance site was sliced into the mice's dorsum, as was previously indicated. Thus, to remove the fur from each animal's dorsum, a cordless electric mouse trimmer (Wahl Trimmer Organization, Illinois, USA) was used. When it was time for the animals to go to sleep, they were put under controlled sedation and had 70% ethanol applied to their entire body to clean and disinfect it. Using a sterile 2.5 by 1.5-centimeter acrylic stencil, the immaculate dorsal surface of the skin was painted. Using sterile forceps and scissors under an upward laminar stream framework, the entire thickness skin fold was excised in an aseptic setting to create a complete thickness dermal injury. For the duration of the examinations, each injured animal was housed in a separate, sterile polypropylene cage. The following studies were carried out:

- **Wound contraction:** An unmistakable chart network was used to measure the injured area daily after the injury,

calculating the daily constriction till full healing. One-millimeter squares were used to cover the extraction wound, and the location was identified by increasing the average length and width[5].

- **Mean wound healing time:** In a further experiment, all the animals were observed until their wounds healed fully, and the mean healing time was computed by adding together all the healed wounds in the mice who received MPE.
- **Biochemical estimations:** MPE's effect on the biochemical profiles of granulation tissues from wounds treated with or without MPE was investigated in this study. There were 200 rats used, 20 for each MPE dosage and CMC group[6].
- **Collagen:** By hydrolyzing, neutralizing, and adding chloramine-T reagent, the hydroxyproline concentration in granulation tissues was ascertained. A twin beam UV-visible spectrophotometer was used to measure each sample's absorbance. Collagen content is measured in milligrammes per gramme of dry tissue weight and was determined by multiplying the total amount by 6.94.
- **Estimation of Hexosamine:** The concentrations of hexosamine in granulation tissues were estimated using the Elson and Morgan method. The tissues of five animals were hydrolyzed, neutralized, and then acetylacetone, ethanol, and ρ–dimethylaminobenzaldehyde solution were added. Hexosamine amount was calculated by measuring absorbance at 530 nm and comparing the results to a reference curve.
- **Deoxyribonucleic acid (DNA):** Burton's method was applied after centrifuging dry granulation tissues and allowing them to incubate. Burton's diphenylamine reagent, 60% perchloric acid, and ethanol were used to hydrolyze DNA. A twofold pillar UV-noticeable spectrophotometer was utilized to quantify the absorbance, and milligrammes of DNA per gramme of dry tissue weight was the resultant calculation.
- **Nitric oxide (NO):** The study determined the end products of nitric oxide generation by measuring the levels of nitrite in wound granulation tissue. Using Griess reagent, the tissues were homogenized, centrifuged, and the amounts of nitrite were determined. Sodium nitrite was the standard utilized, and its values were expressed as μM/100 mg of dry tissue weight.
- **Assessment of antioxidants:** The degrees of glutathione (GSH), catalase, superoxide dismutase (Grass), and lipid peroxidation (LOO) in the healing wound granulation tissue were estimated by homogenizing the example 10% in phosphate cushioned saline[7].
- **Protein estimation:** Using a modified Lowry et al. approach, the study evaluated the total protein content of granulation tissues in regenerating wounds. Using the standard curve, the protein content of test samples was ascertained...
- **Glutathione (GSH):** Materials were precipitated with 25% TCA, centrifuged, and combined with DTNB

and sodium phosphate buffer. This method was utilized to quantify the levels of GSH, as described by Moron et al. A UV-visible spectrophotometer was used to measure the absorbance.

- **Catalase activity:** The catalase activity was assessed by means of the catalytic reduction of hydrogen peroxide. In a nutshell, the granulation tissue homogenate was combined with hydrogen peroxide and incubated at 37 °C. A UV-VIS spectrophotometer was used to measure the absorbance at 240 nm in relation to nothing at predefined intervals in order to trace the breakdown of hydrogen peroxide[8].
- **Superoxide Dismutase (SOD):** SOD activity was measured using the Ewing & Janero procedure. The mixture of cell homogenate and reagent was then incubated and stopped. After making a blank and measuring the sample's absorbance in a UV-VIS[9] spectrophotometer, the percentage of inhibition was calculated as follows: –

PI=Sample–Blank/Sample x100

- **Lipid peroxidation (LOO):** The homogenate was combined with HCl, trichloroacetic corrosive, thiobarbituric corrosive, and butylated hydroxytoluene. The mixture was then allowed to incubate for a duration of 25 minutes[10], centrifuged, and absorbance was measured using a UV-VIS spectrophotometer.

4. RESULT & DISCUSSION

4.1.Wound contraction

An exact check of wound recovery and recuperating might be gotten by occasionally estimating the region of the injury and assessing how much withdrawal. Each twister's region at a given moment is displayed as a level of its underlying size on the very beginning (Figure 2). Plotted as a component of days in the wake of injuring is the mean relating area of twisted for each gathering (Figure 2). Continuous estimations of the injury locales showed that the extraction twister's pace of compression expanded after some time, while the untreated injury mended completely by day 24 (Figure 2). Wound compression was upgraded in a portion subordinate way in mice treated with differing doses of MPE (Figure 2). Up until nine days following treatment, the creatures' injury compression was basically indistinguishable from that of the gatherings treated with the most reduced portion of 50 mg/kg; from that point onward, the injury constriction expanded, and by day 22, the creatures' injuries had completely mended. A second expansion in the MPE portion to 100 mg/kg accelerated the recuperating system; yet, by day 22, the injury was totally shut, very much like with 50 mg/kg MPE. A more prominent injury constriction and a deferral of 20 and 18 days, separately, in the full conclusion of the injury were indications of sped up injury recovery when the measurements of MPE was raised to 150 and 200 mg/kg (Figure 2).

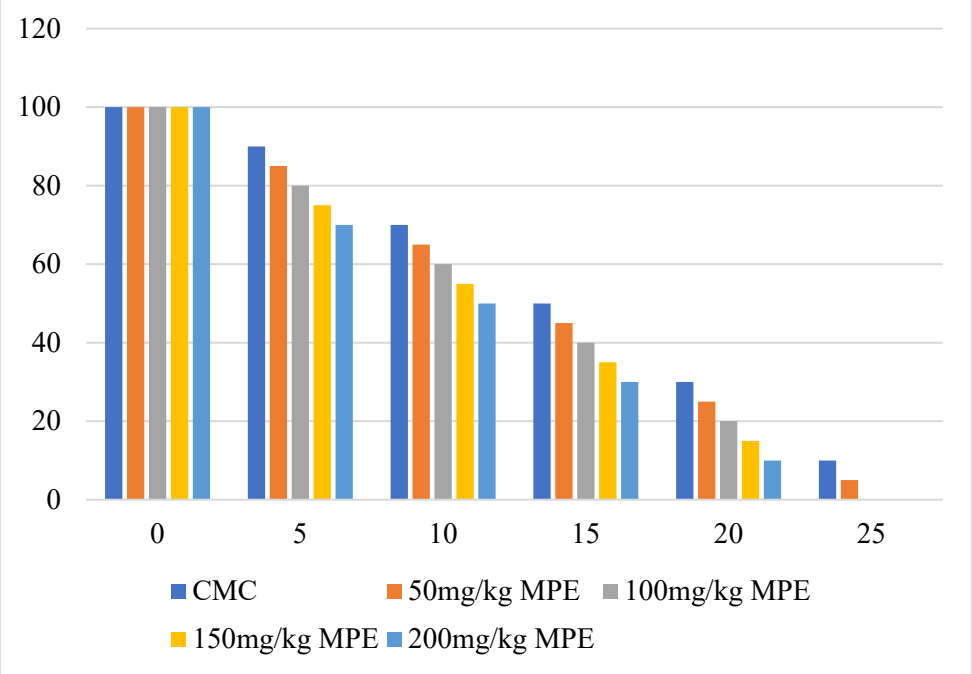

Figure 2: Speed increase of twisted compression by various portions of ethanol concentrate of Mimosa pudica (MPE) in the Swiss pale skinned

person mice caused with profound dermal extraction wound.

Squares: CMC; Circles: 50mg/kg MPE; Triangles: 100mg/kg MPE; Stars: 150mg/kg MPE and Jewels: 200mg/kg MPE

4.2. Mean wound healing time

With time, the injury will totally contract and recuperate assuming it keeps on contracting consistently. The day when an injury completely recuperated was noted and customary visual checking of the injury was finished. A portion subordinate diminishing in the mean injury recuperating time was found in the extraction wounds under routine checking (Figure 3). Creatures getting 50 mg/kg had a mean injury mending season of 22 days, while the CMC treated gathering's mean injury recuperating season of 24 days diminished with MPE treatment (Figure 3). The mean injury recuperating time was additionally brought down to 21 days after the MPE dose was expanded to 100 mg. When contrasted with CMC treatment, the mean injury recuperating time diminished by 6 days at 200 mg/kg, the most noteworthy decrease being 18 days (Figure 3).

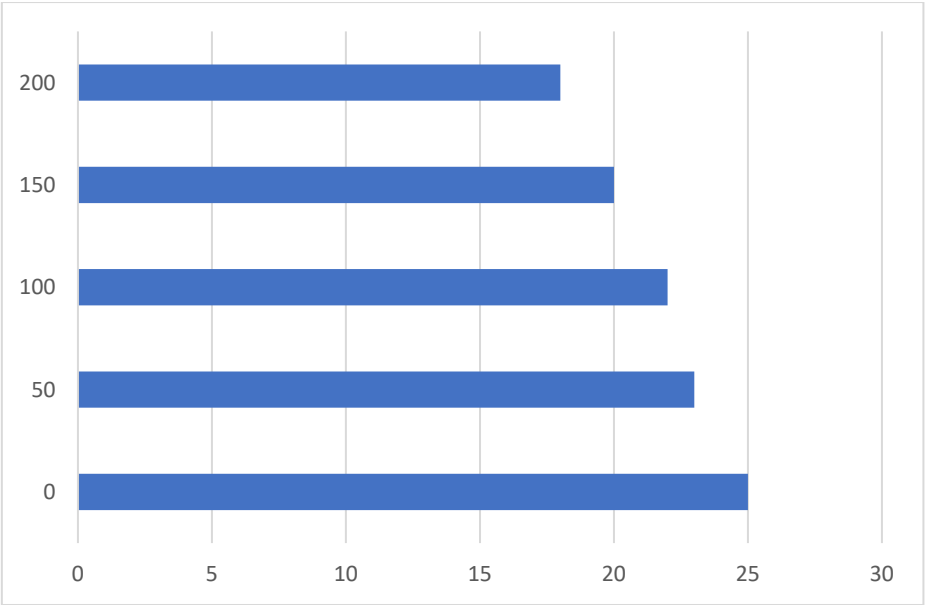

Figure 3: Expansion in the mean injury recuperating season of profound dermal extraction injury of mice treated with various portions of ethanol concentrate of Mimosa pudica.

Starting from the start of mankind's set of experiences, plants and spices have been used to fix many ailments in individuals. Numerous customary clinical frameworks, similar to Chinese and Ayurvedic medication, have depended vigorously on normal solutions for recuperate different human issues. With no bad aftereffects, these medicines have been attempted and tried for some ages. Restorative plants' adequacy in treating human sicknesses could originate from their ability to deliver assorted phytochemicals to meet their own metabolic necessities. Utilizing the entire concentrate will give ideal reparability with no regrettable aftereffects and contain these phytochemicals. The objective of the ongoing review is to examine the job that lajwanti, or Mimosa pudica, plays in the mending of extreme dermal extraction wounds in Swiss pale skinned person mice.

The most common way of recuperating an injury is complicated and follows a set at this point orderly way. It involves the cooperation and synchronization of different cell types tracked down in the injury bed or attracted from the injury's outskirts, as well as the endothelium framework to direct the mending system. Three physiological responses — wound redesigning, wound recovery, and aggravation — are in many cases engaged with the recuperating system. After an injury, irritation is the body's most memorable response and is important to attract more cells that are fundamental to the recuperating system. Neutrophils, monocytes, and macrophages move into the injury bed to start the fiery stage. Their presence triggers debridement and the arrival of a few cytokines vital for the injury to appropriately recuperate.

The recuperating system of wounds includes the planned endeavors of different cells, including platelets in the blood, neutrophils, monocytes, fibroblasts, endothelial cells, and keratinocytes. Prescription can assist with limiting

anomalies and work on injury recovery and fix. Lajwanti ethanol remove has been displayed to further develop twisted recuperating in a portion subordinate way, with the most extensive level of speed increase accomplished at 200 mg/kg MPE. Wound conclusion is influenced by wound compression, making the harmed district reduce over the long run. The injury's constriction is set off by contractile myofiborblasts, which move from the unaffected dermis to the injury granulation tissue. Assuming MPE treatment had been given rather than the standard untreated benchmark group, it might have caused more grounded withdrawal and before wound recuperating.

The extracellular lattice (ECM) assumes a urgent part in keeping up with wound primary respectability during recuperating. Collagens are the main proteins in the ECM, associated with cell bond, relocation, tissue morphogenesis, platform, and fix. MPE treatment has been displayed to increment collagen amalgamation in mice, ascorbic corrosive, curcumin, and Nigella sativa. This might add to expanded injury strength and early recuperating. MPE treatment likewise diminished aggravation, demonstrating the headway of recovery and early twisted conclusion in recovering injuries.

Receptive oxygen species (ROS) are fundamental for wound mending, especially in the beginning stages when they advance cell flagging.

Specifically, ROS stimulate VEGF (vascul ar endothelial growth factor) in keratinocyt es, accelerating angiogenesis and the early stages of healing.

Either way, too many ROS should be elimi nated because they could hinder the healin g process.

MPE has reduced lipid peroxidation, a sign of oxidative strain after damage, while sup eroxide dismutase activity, glutathione lev els, and catalase have all increased.

Recent observations indicate that ascorbic corrosive, curcumin, and Nigella sativa ext ract increase GSH, GSHpx, and superoxid e dismutase in mice recovering from extrac tion injuries.

By increasing collagen, hexosamine, and DNA combination, reducing the number of additional radicals, and stimulating the production of cytokines such as PDGF, TGF-β, and VEGF, lajwanti concentrate may hasten twisted healing. Additionally, it may trigger Nrf2 flagging, which reduces discomfort during wound healing and repair. In any event, it is uncertain exactly what the precise activity system is. Nearby phytochemicals like mimosine, flavonoids like quercetin, leuteolin, and rutin may contribute to the protracted injury mending development in the MPE.

5. CONCLUSION

The concentrate on the injury mending viability of Mimosa pudica shows that its ethanol remove (MPE) fundamentally speeds up injury recuperating in a profound dermal extraction model. Organization of MPE at portions 100, 150, 200, and 50 mg/kg of body weight brought about prominent enhancements in injury compression and decreased mending time contrasted with the benchmark group. Biochemical examinations uncovered expanded hydroxyproline levels, demonstrating upgraded collagen

combination, which adds to further developed tissue recovery and strength. Histopathological assessments further upheld these discoveries, showing better re-epithelialization and fibroblast expansion in MPE-treated injuries. In general, Mimosa pudica shows promising potential as a characteristic injury recuperating specialist.

REFERENCES

1. Adurosakin, O. E., Iweala, E. J., Otike, J. O., Dike, E. D., Uche, M. E., Owanta, J. I., ... & Ugbogu, E. A. (2023). Ethnomedicinal uses, phytochemistry, pharmacological activities and toxicological effects of Mimosa pudica-A review. Pharmacological Research-Modern Chinese Medicine, 7, 100241.
2. Baharuddin, N. S., Roslan, M. A. M., Bawzer, M. A. M., Mohamad Azzeme, A., Rahman, Z. A., Khayat, M. E., ... & Sobri, Z. M. (2021). Response surface optimization of extraction conditions and in vitro antioxidant and antidiabetic evaluation of an under-valued medicinal weed, Mimosa pudica. Plants, 10(8), 1692.
3. Bodhankar, S. S., Devhare, L. D., Meshram, A. S., Moharkar, D. W., & Badwaik, C. B. (2023). Formulation and in vitro evaluation of dental gel containing ethanglic extract of Mimosa pudica. European Chemical Bulletin, 12(5), 1293-1299.
4. Cano, J., Pescuela, J., Antesa, D., Mortejo, V. L., Aguirre, C., & Gallardo, S. A. (2022). Phytochemical Screening and Antimicrobial Assay of Selected Plant Extracts with Ethnopharmacological Potential for Wound Healing. American Journal of Multidisciplinary Research and Innovation, 1(2), 8-17.
5. Fernandes, V. W., Gaonkar, S. L., & Shetty, N. S. (2023). Phytochemistry and Medicinal Importance of Herb Mimosa pudica: A Review. The Natural Products Journal, 13(4), 42-63.
6. Fernandes, V. W., Gaonkar, S. L., & Shetty, N. S. (2023). Phytochemistry and Medicinal Importance of Herb Mimosa pudica: A Review. The Natural Products Journal, 13(4), 42-63.
7. Kumar, V. (2021). Phytochemical, pharmacological activities and ayurvedic significances of magical plant Mimosa pudica Linn. Mini-Reviews in Organic Chemistry, 18(3), 296-312.
8. Lan, P. T., Huyen, N. T. N., Kim, S. Y., Hang, P. T. N., & Tung, B. T. (2021). Phytochemical analysis and protective effect of ethanolic extract of Mimosa pudica Linn. on methylglyoxal-induced glucotoxicity. Journal of Applied Pharmaceutical Science, 11(9), 093-101.
9. Majeed, I., Rizwan, K., Ashar, A., Rasheed, T., Amarowicz, R., Kausar, H., ... & Marceanu, L. G. (2021). A comprehensive review of the ethnotraditional uses and biological and pharmacological potential *of* the genus

mimosa. International Journal of Molecular Sciences, 22(14), 7463.

10. Mandal, A. K., Pandey, A., Sah, R. K., Baral, A., & Sah, P. (2022). In Vitro Antioxidant and Antimicrobial Potency of Mimosa pudica of Nepalese Terai Region: Insight into L-Mimosine as an Antibacterial Agent. Evidence-Based Complementary and Alternative Medicine, 2022(1), 6790314.

11. Permatasari, R. Y., Hestianah, E. P., Legowo, D., Rachmawati, K., & Arifin, Z. (2022). The Effect of Mimosa Pudica Root Extract on Cerebrum Histopathological of Rattus Norvegicus Induced with Naja Sputatrix Venom. Journal of Basic Medical Veterinary, 11(1), 37-48.

12. Salazar-Gómez, A., & Alonso-Castro, A. J. (2022). Medicinal plants from Latin America with wound healing activity: Ethnomedicine, phytochemistry, preclinical and clinical studies—A review. Pharmaceuticals, 15(9), 1095.

13. Singh, S., Dodiya, T. R., Singh, S., & Dodiya, R. (2021). Topical wound healing, antimicrobial and antioxidant potential of Mimosa pudica Linn root extracted using n-hexane followed by methanol, fortified in ointment base. International Journal of Pharmaceutical Sciences and Nanotechnology, 14(3), 5472-5480.

14. Tripathi, A. K., Soni, R., & Verma, S. (2022). A review on ethnopharmacological applications, pharmacological activities, and bioactive compounds of Mimosa pudica (linn.). Research Journal of Pharmacy and Technology, 15(9), 4293-4299.

15. Tyavambiza, C., Dube, P., Goboza, M., Meyer, S., Madiehe, A. M., & Meyer, M. (2021). Wound healing activities and potential of selected african medicinal plants and their synthesized biogenic nanoparticles. Plants, 10(12), 2635.