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FORMULATION AND EVALUATION OF POLYHERBAL WOUND HEALING OINTMENT USING *Pergularia daemia, Kleinia grandiflora, Myristica fragrans, and Azadirachta indica.*

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Abstract: The current work is aimed at the development and assessment of a polyherbal wound-healing ointment from ethanolic extracts of Pergularia daemia, Kleinia grandiflora, Myristica fragrans, and Azadirachta indica. These plants were chosen according to their traditional medicinal applications and documented pharmacological activities, such as antimicrobial, anti-inflammatory, and antioxidant activities. The extracts were isolated through Soxhlet extraction and used to formulate a topical ointment base through a double-boiling technique. Physical properties like pH (6.2), consistency, spreadability, and stability up to 30 days were determined for the ointment prepared. Phytochemical screening indicated the presence of major bioactive compounds such as flavonoids, alkaloids, tannins, and terpenoids. Antimicrobial potential was established through agar well diffusion with inhibitory zones against Staphylococcus aureus and Escherichia coli. The results indicate that the polyherbal preparation is a potential natural substitute for wound-healing purposes and deserves further in vivo and clinical studies.

Keywords **- Polyherbal ointment, Pergularia daemia, Kleinia grandiflora, Myristica fragrans, Azadirachta indica, Phytochemical screening, Soxhlet extraction, Antimicrobial activity, Agar well diffusion, Herbal formulation, Topical application, Natural medicine.**

Introduction

A wound or injury is any disruption of the normal function or structure of the skin and underlying tissues, typically resulting from trauma such as cuts, burns, punctures, or blunt trauma. Wounds are commonly classified as open wounds (e.g., abrasions, lacerations, incisions) and closed wounds (e.g., contusions, hematomas). The body reacts with a multifaceted healing process involving remodeling, tissue formation, and inflammation. Proper wound management is important to avoid such complications as infection and to encourage effective healing (Guo & DiPietro 2010).

The present study proposes and assesses a polyherbal wound healing ointment with the application of Pergularia daemia, Kleinia grandiflora, Myristica fragrans, and Azadirachta indica to develop an safe, efficient, and cost-effective natural remedy for wound management.Pergularia daemia has long been practiced in Indian medicine due to its strong anti-inflammatory and antibacterial effects. Alkaloids, flavonoids, and phenolic compounds to its therapeutic capability (Tatiya et al., 2012). Kleinia grandiflora is a less-explored medicinal plant that exhibits antimicrobial and protective skin effects owing to its high tannins and phenols content (Kala et al., 2018).

1. Pergularia Daemia

Pergularia daemia (Family: Asclepiadaceae), or Veliparuthi in Tamil and Uttaravaruni in Sanskrit, is a softwooded, climbing herb of tropical India and Sri Lanka. It is used traditionally in Ayurveda and Siddha to treat wounds, inflammation, digestive problems, asthma, and skin infections (Kirtikar & Basu, 2006).
Phytochemically, it has flavonoids, alkaloids, tannins, saponins, and phenols responsible for its anti-inflammatory, antimicrobial, antioxidant, and wound-healing activities (Tatiya et al., 2012; Prajapati et al., 2003). The herb stimulates collagen synthesis and epithelialization and supports tissue regeneration (Jain et al., 2010). It also inhibits bacteria such as Staphylococcus aureus and E. coli and inactivates free radicals that delay healing (Muthu et al., 2006).

2. Kleinia Grandiflora

Kleinia grandiflora (Wall. ex DC.) N.Rani is a succulent herb in the family Asteraceae and is distributed in dry and sunny areas of India, Nepal, and Southeast Asia. It is noted to be robust and is utilized in both traditional medicine and ecological landscaping (NParks, 2023). In conventional practice, it is utilized to treat various conditions like fever, asthma, headache, swelling, fracture, and even snake bites. It is also employed in the treatment of malaria and hypertension by Indian and Nepalese tribes (NEIST, 2023).
Pharmacologically, the plant is endowed with antipyretic, anti-inflammatory, analgesic, antimicrobial, and wound-healing properties. Pandey et al. (2012) substantiated in their study that its methanolic and aqueous leaf extracts are effective in fever reduction in rat models, similar to that of standard drugs. These activities are attributed to its high phytochemical content in the form of β-sitosterol, lupeol, friedelin, and flavonoids, which modulate inflammation, combat oxidative stress, and improve skin tissue repair.

3. Myristica fragrans (Nutmeg)

Myristica fragrans, or nutmeg, is an evergreen tree belonging to the family Myristicaceae, indigenous to the Moluccas Islands but commonly grown in India, Sri Lanka, and Grenada. Nutmeg (seed) and mace (aril) are utilized as cooking spices and in ancient medicine (Mathew & Kamath, 2014). Nutmeg in Ayurveda and Unani is used to treat indigestion, diarrhea, inflammation, toothache, skin diseases, and insomnia. It is also a nervine tonic and aphrodisiac. It pharmacologically possesses antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, and neuroprotective activities (Jaiswal et al., 2009; Sukhdev et al., 2008).

Its pharmacological actions are attributed to compounds such as myristicin, eugenol, safrole, and elemicin. These are responsible for its antimicrobial activity and central nervous system effects, although toxicity is induced by high doses from psychoactive compounds (Lee et al., 2005; Pradeep & Narayanan, 2010).

4. Azadirachta indica (Neem)

Azadirachta indica, also referred to as neem, is an evergreen tree in the Meliaceae family, native to India but cultivated extensively in the tropics. It is famous for its medicinal, agricultural, and cultural importance (Biswas et al., 2002). Neem contains active compounds such as azadirachtin, nimbin, nimbidin, and quercetin, responsible for its robust antibacterial, antifungal, antiviral, anti-inflammatory, and antioxidant activities. Neem has been traditionally used in Ayurveda and Siddha for the management of skin diseases, fevers, infections, diabetes, and dental issues (Subapriya & Nagini, 2005).
Neem oil is particularly prized in wound care and dermatology for its capacity to combat infection and enhance tissue regeneration. It also enhances immune function and oxidative stress reduction. Neem products are also utilized in organic farming as pesticides (Schmutterer, 1995).

I. AIM

To develop and study a polyherbal wound healing ointment based on the synergistic activity of Pergularia daemia, Kleiria grandiflora, Myristica fragrans, and Azadirachta indica, and scientifically evaluate its activity through phytochemical and pharmacological studies.

II. MATERIALS AND METHODS

COLLECTION AND SAMPLE PREPARATION:

- Pergularia Daemia
- Kleinia Grandiflora
- Myristica fragrans (Nutmeg)
- Azadirachta indica (Neem) were harvested.

GRINDING OF DRIED SAMPLES:

- Dried leaves of the plants were ground into powder form using a mechanical grinder.

SOXHLET EXTRACTION:

- The powdered herbal blend was extracted by Soxhlet using ethanol as the solvent.
- A Liebig condenser was employed in the setup to cool the vapors of the solvent and provide continuous extraction.

CONCENTRATION OF EXTRACT:

- The solvent was evaporated after the extraction and the Petri plate containing the concentrated herbal extract.
- The Petri plate was left on a steam bath to dehydrate any remaining moisture.

PREPARATION OF OINTMENT (DOUBLE BOILING METHOD):

- Beeswax was melted in a clean container using the double boiling method.
- After melting, coconut oil, olive oil, and polyherbal extract were added and blended well, followed by the addition of vitamin E oil, lavender oil, and aloe vera gel.
- The blend was shaken well until a uniform texture was reached.

COOLING AND STORAGE:

- The resultant mixture was cooled and hardened into an ointment texture.
- The ointment prepared was packed in tight containers for further analysis.

III. RESULT AND DISCUSSION

PHYTOCHEMICAL ANALYSES

Phytochemical analyses were done for polyherbal plant extract. The plant extract has shown the presence of alkaloids, carbohydrates,flavonoids, glycosides, phenols, saponins, tannins, and terepenoids.

PHYTOCHEMICAL	PRESENCE (+) / ABSENCE (-)
Alkaloids	+
Saponins	+
Phenols	+
Tannins	+
Flavonoids	+
Terpenoids	+
Carbohydrates	+
Glycosides	+

ANTI-MICROBIAL ACTIVITY

• The antimicrobial efficacy was evaluated using the agar well diffusion method.
• The polyherbal extract ointment exhibited zones of inhibition against Staphylococcus aureus and Escherichia coli.

Escherichia coli	**Zone of inhibition**
Positive control (gentamicin 10µg)	21mm
Sample 100µl	14mm
Sample 50µl	8mm
Negative control (DMSO)	Nil
Staphylococcus aureus	**Zone of inhibition**
Positive control (gentamicin 10µg)	20mm
Sample 100µl	16mm
Sample 50µl	9mm
Negative control (DMSO)	Nil

PHYSICAL EVALUATION OF OINTMENT

• Color: Greenish, indicating natural composition
• Odor: Pleasant herbal aroma, herbal leaves dominant
• Consistency: Smooth, semi-solid, homogenous
• Spreadability: Easily applicable
• pH: 6.2–suitable for skin application
• Stability: Stable for 30 days at 37°

FINAL PRODUCT

POLYHERBAL OINTMENT

IV. CONCLUSION

The current research involved the development and assessment of a polyherbal ointment for wound healing with Pergularia daemia, Kleinia grandiflora, Myristica fragrans, and Azadirachta indica. These species were used based on their well-documented ethnomedicinal properties and scientifically validated therapeutic potentials including antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities.

The herbal extracts were procured by the process of ethanolic maceration, which is efficient in extracting a wide range of phytochemicals such as flavonoids, tannins, phenols, and essential oils. These bioactives have been reported to be useful in skin regeneration, combat infections, and combat inflammation. The extracts were blended with a beeswax ointment to form a cosmetic formulation that was acceptable as well as functional for application on the skin.

The last ointment presented desirable physicochemical characteristics, i.e., smooth and uniform texture, stable pH (6.2), acceptable spreadability, and 30-day physical stability without microbial contamination. All these characteristics indicate that the formulation is skin-friendly, non-irritating, and easy to apply.

The therapeutic potential is highly supported by literature. Every plant contributed in a distinctive way to the formulation:

- Pergularia daemia provided antioxidant and antimicrobial activity.
- Kleinia grandiflora introduced anti-inflammatory and analgesic activities.
- Myristica fragrans (nutmeg) provided essential oils and tissue regenerative agents.
- Azadirachta indica (neem) provided broad-spectrum antimicrobial and skin-soothing properties.

These herbs combined provide a synergistic formula that has the potential to aid in the body's natural wound healing process.

In short, the research proves that this polyherbal ointment is pharmaceutically stable, pleasing to the eye, and promising for topical applications in wound care. It presents a cheaper, natural alternative to man-made formulations. Antimicrobial activity testing, wound healing assays, and clinical trials are recommended for future research to confirm and improve on the therapeutic value of this herbal medication.

V. REFERENCE

1. Guo, S., & DiPietro, L. A. (2010). Factors affecting wound healing. Journal of Dental Research, 89(3), 219–229.

2. Mathew, S., & Kamath, V. (2014). Pharmacognostic and phytochemical studies of Myristica fragrans Houtt. - A review. International Journal of Pharmaceutical Sciences and Research, 5(6), 2125–2130.

3. Biswas, K., Chattopadhyay, I., Banerjee, R. K., & Bandyopadhyay, U. (2002). Biological activities and medicinal properties of neem (Azadirachta indica). Current Science, 82(11), 1336–1345.

4. Subapriya, R., & Nagini, S. (2005). Medicinal properties of neem leaves: A review. Current Medicinal Chemistry - Anti-Cancer Agents, 5(2), 149–156.

5. Schmutterer, H. (1995). The Neem Tree: Source of Unique Natural Products for Integrated Pest Management, Medicine, Industry, and Other Purposes. VCH Publishers.

6. Jaiswal, N., Singh, P., & Singh, D. K. (2009). Pharmacological profile of Myristica fragrans: A review. International Journal of Pharma and Bio Sciences, 1(1), 1–11.

7. Pradeep, K., & Narayanan, P. M. (2010). Antimicrobial activity of Myristica fragrans Houtt. (Nutmeg) against food-borne pathogens. International Journal of Pharma and Bio Sciences, 1(4), 351–355.

8. Pandey, M. M., et al. (2012). Antipyretic activity of leaf extracts of ethnomedicinal plant Kleinia grandiflora (Asteraceae). Der Pharmacia Lettre, 4(6), 1789–1793.

9. Bhaskar, V. H., & Balakrishnan, N. (2009). Veliparuthi (Pergularia daemia (Forsk.) Chiov.)-as a phytomedicine: a review. Int. J. Pharmtech. Res, 1, 1305-1313.

10. Chandak, R. R., & Dighe, N. S. (2019). A review on phytochemical & pharmacological profile of Pergularia daemia linn. Journal of Drug Delivery and Therapeutics, 9, 809-814.

11. NParks. (2023). Kleinia grandiflora (Wall. ex DC.) N.Rani. FloraFaunaWeb, National Parks Board Singapore.

12. NEIST. (2023). Kleinia grandiflora Profile. Osadhi Database, CSIR – North East Institute of Science and Technology.

13. Tatiya, A. U., Saluja, A. K., Surana, S. J., & Bhutada, R. H. (2012). Anti-inflammatory and antioxidant activities of Pergularia daemia. Journal of Ethnopharmacology, 140(2), 215–221.

14. Mishra, S. B., & Singh, R. K. (2011). Wound healing activity of medicinal plants: A review. International Journal of Chemical and Analytical Science, 2(12), 1543–1551.

15. Divya, K., & Prasanth, D. A. (2013). Formulation and evaluation of herbal ointment for wound healing activity. World Journal of Pharmaceutical Research, 2(5), 1342 1348.

16. Khatik, G. L., Tiwari, R., & Patel, A. (2013). Formulation and evaluation of herbal ointment containing neem and turmeric extract. World Journal of Pharmacy and Pharmaceutical Sciences, 2(6), 6247–6253.

17. Sateesh, S., & Suneetha, J. (2015). Formulation and evaluation of polyherbal ointment for antimicrobial activity. World Journal of Pharmacy and Pharmaceutical Sciences, 4(9), 1110–1117.

18. Asghar, H. A., Abbas, S. Q., Arshad, M. K., Jabin, A., Usman, B., Aslam, M., & Asghar, A. (2022). Therapeutic potential of Azadirachta indica (Neem)-a comprehensive review. Sch Int J Tradit Complement Med, 5(3), 47-64.

19. Asgarpanah, J., & Kazemivash, N. (2012). Phytochemistry and pharmacologic properties of Myristica fragrans Hoyutt.: A review. African Journal of Biotechnology, 11(65), 12787-12793.

20. Thirumalai, T., Kelumalai, E., & David, E. (2011). Antimicrobial and antioxidant activity of Myristica fragrans (nutmeg). Journal of Medicinal Plants Research, 5(10), 1880–1884.