

Polyherbal Antimicrobial Creams in Wound Management: A Critical Review of Phytochemistry and Pharmacological Evidence

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ABSTRACT

Wound healing is a complex, multistage physiological process involving hemostasis, inflammation, proliferation, and tissue remodeling, aimed at restoring structural and functional integrity of damaged skin. However, the effective management of acute and chronic wounds remains challenging due to persistent microbial infections, excessive inflammation, oxidative stress, and the emergence of antimicrobial resistance. In recent years, increasing attention has been directed toward plant-based therapeutics as safer and cost-effective alternatives to conventional treatments. Among these, polyherbal formulations have emerged as a promising strategy owing to their synergistic interactions, which enhance therapeutic efficacy while minimizing adverse effects.

This review critically examines the role of polyherbal antimicrobial creams in wound healing, focusing on their phytochemical composition, pharmacological mechanisms, and therapeutic potential. Key medicinal plants such as Aloe vera, Allium sativum, Curcuma longa, Azadirachta indica, Carica papaya, Glycyrrhiza glabra, Ocimum sanctum, Melaleuca alternifolia, Sida acuta, and Moringa oleifera are discussed with respect to their bioactive constituents and reported activities, including antimicrobial, anti-inflammatory, antioxidant, and collagen-promoting effects. The review further highlights the significance of controlling wound microbiota, particularly pathogenic organisms such as *Staphylococcus aureus* and *Pseudomonas aeruginosa*, in accelerating the healing process.

Collectively, polyherbal antimicrobial creams offer a multifaceted therapeutic approach by integrating infection control with enhanced tissue regeneration. Despite promising preclinical evidence, challenges related to standardization, formulation optimization, and clinical validation remain. Therefore, future research should emphasize well-designed experimental and clinical studies to establish the efficacy, safety, and reproducibility of these formulations for their successful translation into modern wound care systems.

Keywords: Polyherbal formulation; Wound healing; Antimicrobial activity; Phytochemicals; Herbal medicine; Topical drug delivery; Tissue regeneration

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INTRODUCTION

The term “antimicrobial activity” describes a substances capacity to either totally eradicate or prevent the growth of microorganisms, such as bacteria and fungi. In 2023,

the estimated value of the global market for animal wound treatment was 1.4 billion.

Plants and their derivatives have served as important sources of medicine since the earliest stages of human

civilization. In ancient Indian tradition, the medicinal use of plants is documented in the Rigveda, which is considered one of the oldest compilations of human knowledge and is believed to have been composed between 4500 and 1600 B.C. This text contains some of the earliest references to herbal remedies in Hindu culture. The traditional medical system of Ayurveda is based on eight major branches that collectively explain different aspects of life science, healing practices, disease management, and the characteristics and uses of medicinal substances [1].

A Wound is an injury to live tissue caused by an accident, surgery, violence, or some persistent illness it is typically characterized by a skin membrane fracture and damage to underlying tissue or organs. Numerous mechanical, physical, chemical, and biological variables, such as burns, animal bites, and unintentional trauma, can cause wounds. The fundamental idea behind wound healing is to lessen tissue damage by supplying tissue damage by supplying adequate nutrients and oxygen to the injured tissue. Restore the wounded parts anatomical development and functionality. The location, look, depth, and cause of the damage can all be used to categorize wounds [2].

- ❖ Wound healing is accomplished in four distinct stages These stages include:
 - Proliferation phase,

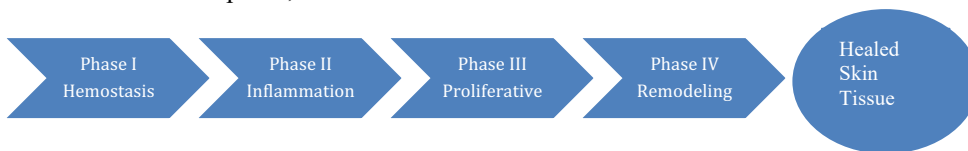


Fig 1: Phases of Wound Healing Recovery

Wound Microbiology:

Healthy, unbroken skin regulates the number of germs that reside on its surface and keeps them from penetrating underlying tissue and eventually causing infection. An environment that is conducive to microbial growth is created when the entire skin is distorted and the tissue beneath is exposed and propagation. The type, depth, and location of the wound determine the microbial species' diversity and abundance.

Wound pollutants come from three major sources. The first source is the environment, which includes airborne microbes and those brought on by severe injuries. Members of the typical skin microflora, including propionibacteria, skin diphtheroids, micrococci, and Staphylococcus epidermidis, are the second source, which comes from the surrounding skin. The oropharyngeal, gastrointestinal, and genitourinary mucosae are the main mucous membranes involved in

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- Remodeling phase,
- Inflammation phase,
- Hemostasis phase

All four procedures must take place for a wound to heal effectively. on schedule and in the proper order. Oxygenation, infection, age and sex hormones, stress, diabetes, obesity, drugs, alcohol misuse, smoking, and diet are all factors that negatively impact the healing process of wounds [3]. Both acute and chronic wounds have been investigated in an effort to develop a novel approach for bettering the treatment of cutaneous wounds. Small-scale acute wounds can be effectively treated, but chronic wounds continue to provide a therapeutic challenge due to high protease activity, infection, inflammation, and hypoxia.

Even though wound care is getting better, many wound repairs are still not well understood, and some of them require more funding [4]. There could be challenges if there are microbes that can cause infection, which increases the cost of therapy and lengthens the recovery period. The kind, depth, location, and quality of the wound, the degree of tissue perfusion, and the host immune response's antimicrobial effectiveness all affect the quantity and variety of microbes [5].

the third class of endogenous sources [6]. According to current claims, aerobic or facultative microorganisms including *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and beta-hemolytic streptococci are the main culprits behind both acute and chronic wound infection and delayed healing. Numerous bacteria, such as *Pseudomonas*, *Streptococcus*, and *Staphylococcus*, can kill host cells and interfere with regular cellular metabolism by producing exotoxins. However, because anaerobic bacteria were likely the source of postoperative problems, scientists are interested in anaerobes [7].

- Multifaceted benefits of Herbal cream:
 - Antimicrobial Properties
 - Skin Health Improvement
 - Antioxidant Properties
 - Skin Disorder Management

Table: List Of Medicinal Plants Use To Treat Wound Healing

| Sr. N | Plant | Synonyms | Part of Plant | Active PhytoConstituent | Extract | Reference |
|-------|----------------|-------------------------------|---------------------|--------------------------------------|--------------------|-----------|
| 1. | Aloe vera | <i>Aloe barbadens Mill.</i> | Leaves | Saponins, Anthraquinone, Amino acid | Alcoholic, Aqueous | 8,9 |
| 2. | Garlic | <i>Allium sativum</i> | Bulb | Flavonoids, Saponins | Ethanollic | 10 |
| 3. | Turmeric | <i>Curcuma longa</i> | Rhizomes | Curcuminoids, Volatile essential oil | Ethanollic | 11 |
| 4. | Honey | <i>Apis mellifera</i> | Secretion from hive | Terpenoids, Saponins, Alkaloids | Distilled water | 12 |
| 5. | Neem | <i>Azadirachta indica</i> | All Portions | Limonoids, Flavonoids | Ethanollic | 13 |
| 6. | Sesame | <i>Sesamum indica L</i> | Seeds | Flavonoids, Phenolic acid | Sesame oil | 14 |
| 7. | Papaya | <i>Carica papaya</i> | Latex, Fruit | Alkaloids, Flavonoids | Ethanollic | 15 |
| 8. | Liquorice | <i>Glycyrrhiza glabra</i> | Roots | Saponins, Flavonoids | Ethanollic | 16 |
| 9. | Tea tree | <i>Melaleuca alternifolia</i> | Essential oil | Terpinen-4-ol | Steam / Water | 17 |
| 10. | Tulsi | <i>Ocimum sanctum</i> | Leaves | Eugenol, Linalool, Rosmarinic acid | Methanollic | 18 |
| 11. | Red sandalwood | <i>Pterocarpus santalinus</i> | Bark wood | Terpenoids, Tannin, Glycosides | Methanollic | 19 |
| 12. | Adusa | <i>Adhatoda vasica</i> | Leaves | Alkaloids, Flavonoids, | Ethanollic | 20 |

| | | | | | | |
|-----|-----------------|---------------------------------|---------------|--------------------------------------|---------------------|----|
| 13. | Forest champa | <i>Spermadictyon suaveolens</i> | Roots | Triterpenes, Alkaloids | Ethanol | 21 |
| 14. | Asthma weed | <i>Euphorbia hirta</i> | Leaves | Alkaloids, Glycosides, Tannins | Ethanol, Methanol | 22 |
| 15. | Jungle flame | <i>Ixora coccinea</i> | Roots, Leaves | Sesquiterpenes, Triterpenes | Ethanol, Chloroform | 23 |
| 16. | Indian olive | <i>Olea europaea</i> | Leaves, Oil | Phenolic, Alkaloids, Flavonoids | Methanol, Ethanol | 24 |
| 17. | Trumpet tree | <i>Cecropia peltata</i> | Leaves | Flavonoids, Alkaloids, Fats | Methanol | 25 |
| 18. | Maidenhair | <i>Ginkgo biloba</i> | Leaves | Flavonoids, Glycosides | Chloroform | 26 |
| 19. | Common wireweed | <i>Sida acuta</i> | Whole plant | Alkaloids, Flavonoids, Terpenoids | Ethanol, Methanol | 27 |
| 20. | Drumstick tree | <i>Moringa oleifera</i> | Leaves | Phenolic, Vit. Vicenin-2, Amino acid | Ethanol | 28 |

POTENTIAL OF DIFFERENT DRUG:

➤ **Aloe vera (*Aloe Barbadensis Miller*):**

Aloe Barbadensis Miller is the most well-known species of Aloe vera (AV), which is a member of the Liliaceae family and has been utilized in traditional medicine for thousands of years [29]. One of the most well-known medicinal herbs in the world, its numerous therapeutic advantages make it a miraculous gift from nature [30]. Aloe vera remarkable healing capacity has been shown in numerous research, which have also discovered the numerous bioactive substances that promote wound healing. The aloe leaf has a three-layered structure. A transparent gel made up of 99% water and 1% solid matter makes up the inner layer, which compresses more than 75 distinct substances, including glucomannans, amino acids, lipids, sterols, and vitamins. It is a yellow juice that contains glycosides and anthraquinones, and it is a bitter latex. Proteins and carbohydrates are produced by the thick cortex that forms the outer layer [31,32].

➤ **Garlic (*Allium sativum L.*):**

Allium sativum L., or garlic, is a member of the Alliaceae family and is well known for being a useful spice and a

common treatment for a number of illnesses and physiological conditions. Garlic is grown almost everywhere in the world, but it seems to have started in central Asia, then moved to China, the Near East, and the Mediterranean region before heading west to Central and Southern Europe, Northern Africa (including Egypt), and Mexico [33]. Crushed garlic has long been recognized for its antimicrobial qualities. It has been demonstrated that different garlic preparations display a broad range of antimicrobial action against both Gram-positive and Gram-negative bacteria, such as Salmonella, Escherichia, Staphylococcus, Streptococcus, Klebsiella, Proteus, Bacillus, and Clostridium species. Garlic can affect even acid-fast microorganisms like Mycobacterium tuberculosis. An examination of steam distillations of crushed garlic cloves carried out more than a century ago revealed a range of allyl The component that gives crushed garlic cloves their exceptional antibacterial activity was found by sulfides. The substance proved to be an oxygenated sulfur compound, which they named allicin after the Latin name of the garlic plant, *Allium sativum* [34,35].

➤ **Turmeric (*Curcuma longa L.*):**

Medicinal plant turmeric (*Curcuma longa L.*) is a member of

the *Zingiberaceae* family. This perennial plant has underground rhizomes and grows to a reasonable height. Most rhizomes are oblong, pyriform, ovate, and frequently have small branches [36]. In South Asia, India, and China, it is widely used as a coloring, flavoring, and preservation. It is well known for its special therapeutic qualities. Tropical countries including Pakistan, China, Peru, and India grow it [37]. It is believed that *Curcuma longa* is indigenous to India. It is grown commercially in China, India, and several South Asian nations. Turmeric improves the production of mucus in the digestive tract and has a positive impact on the digestive system. Turmeric's antibacterial, antihelminthic, anticancer, antiparasitic, antiseptic, anti-oxidative, anti-inflammatory, anti-rheumatic, anti-tumor, anti-phlegmatic, antiviral, astringent, aromatic, blood purifier, clear skin color, remove wound maggots, hepatoprotective, stop liver obstruction, heals wounds, stimulant, and sedative in the food industries [38].

➤ **Honey (*Apis mellifera*):**

Honey bees (*Apis mellifera*) create honey, a natural material. They gather plant fluids, floral nectar, or plant-sucking insect excretions and turn them into honey [39]. Honey is regarded as a natural, nutrient-dense, and healthful food whose composition is greatly varied based on its botanical and geographic origin [40]. It is primarily made up of a mixture of various sugars (80–85%), water (15–17%), and proteins (0.1–0.4%). To a lesser extent, it also contains organic acids, enzymes, vitamins, minerals, and phenolic compounds, all of which significantly contribute to its sensory and functional qualities. The abundance of minerals and phenolic chemicals mostly determines the hue, which can vary from white to dark [41]. When honey is formed from the nectar or honeydew of a single botanical species, it is categorized as monofloral; when it is predominantly present, it is characterized as multifloral. one species of plant [42]. Honey consumption has been associated with antioxidant, anti-inflammatory, antibacterial, and antiviral properties, which has increased interest in this food [40].

➤ **Neem (*Azadirachta indica*):**

The neem tree, or *Azadirachta indica* belongs to the Mahogany family, is a tropical evergreen endemic to the Indian subcontinent [43]. Neem has been used for thousands of years in traditional medicine to treat a variety of common human ailments and in agriculture to control pests. *A. indica*'s potential as a non-toxic infection-control agent for use in agriculture first sparked interest from all around the world [44]. The neem tree's many parts have been utilized for their purported antipyretic, antacid, antiparasitic, antibacterial, antiviral, antidiabetic, contraceptive, antidermatitic, anticancer, anti-inflammatory, antioxidant, antifungal, dental, and other healing and protective qualities for millennia in traditional Indian medicine [44,45]. Nearly every component of *A. indica*, including the stem, bark, roots, leaves, gum, seeds, fruits, flowers, and more, has been

utilized as a home remedy for a variety of ailments.

➤ **Sesame (*Sesamum indica L.*):**

Sesame (*Sesamum indicum L.*) belongs to the Pedaliaceae Family is one of these drugs is sesame Iran has long employed medicinal plants for a variety of purposes [46]. This study, which examined sesame oil extract's pro-wound healing properties, was motivated by the use of the extract in our local community in the middle of Iran to treat wounds and skin infections. Sesame oil has already been shown to possess antibacterial properties [47]. It is a significant crop for global trade and one of the world's main oil crops. 70% of the 2.6 million tons generated annually originate from Sudan, China, India, and Myanmar. The prolific potential and high oil content of sesame have been the main focus of breeding operations [48,49].

➤ **Papaya (*Carica papaya*):**

Carica papaya L. (Caricaceae) belongs to the Caricaceae Family, Traditional medicine uses because papain, a proteolytic enzyme, is the active ingredient that an effect of ulcer prevention [50]. *C. papaya* has anti-inflammatory, antioxidant, and antibacterial properties [51,52]. Wounds and other skin conditions have historically been treated using *C. papaya*. In developing nations, it is a popular and accessible remedy for a variety of wounds, including burns. *C. papaya* seeds have been used to make a decoction that has been effective to treat inflammation and skin ulcers. The antibacterial properties of *C. papaya* may help heal persistent skin ulcers [51].

➤ **Liquorice (*Glycyrrhiza glabra*):**

Glycyrrhizin glabra, belongs to the Fabaceae Family, a saponin molecule found in licorice is primarily composed of glucuronic acid and glycyrrhetic acid [53]. Wounds and other skin conditions have historically been treated Glycyrrhizin, the primary component, is sometimes known for its licorice flavor and cooling qualities. This component inhibits the proliferation and cytopathology of several viruses, including DNA and RNA viruses, and is relatively heat stable [54,55]. Additionally, it has historically been used to treat bronchitis, allergies, sore throats, coughs, spleens, kidneys, ulcers, and livers. In addition to being used to treat Addison's illness, osteoarthritis, rheumatoid arthritis, and low blood sugar. While licorice root is utilized as the first line of treatment for a number of illnesses due to its highly therapeutic properties [56].

➤ **Tea tree (*Melaleuca alternifolia*):**

Tea tree oil, the essential oil of the native Australian plant *Melaleuca alternifolia*, belongs to the Myrtle Family, is one such product. Although tea tree oil is primarily marketed for its well-established antibacterial, antifungal, and antiviral properties, it also has anti-inflammatory, analgesic, insecticidal, and antipruritic qualities, with the decolonization of wounds being a coincidental finding. Tea

tree oil is incredibly popular as a topical antimicrobial agent. Similar to this, although tea tree oil is frequently thought of and marketed as having wound-healing qualities, no information on certain wound-healing metrics, like decreased wound size or a quicker time to re-epithelialization, has been published. Both acute and chronic wounds can be treated using a variety of over-the-counter complementary and alternative medicine items [57].

➤ **Tulsi (*Ocimum sanctum*):**

Ocimum sanctum L. (also called *Ocimum tenuiflorum*, Tulsi) belongs to the Lamiaceae Family, is known for its exceptional antibacterial qualities and has been used in Ayurvedic medicine to treat a number of systemic illnesses [58]. The most revered and prized medicinal herb, tulsi, has been used for centuries to cure bacterial, viral, fungal, Wound healing and arthropod-borne illnesses throughout the world, particularly in the Indian subcontinent. *Ocimum sanctum* contains numerous therapeutic qualities that are good for human health and have not been shown to have any serious harmful effects when used regularly. Thus, this plant is distinct from others due to these beneficial qualities [59].

➤ **Red sandalwood (*Pterocarpus santalinus*):**

The common name for *Pterocarpus santalinus* L. (Fabaceae) is Red Sandalwood (English). In India's Ayurvedic medical system, the herb is employed historically used in the treatment of acne, as an antibacterial, and as a wound healer. For headaches and inflammations, a wood paste is applied externally to provide cooling. A fruit decoction is used as an astringent tonic for persistent diarrhea [60]. The plant was tested for analgesic, anti-inflammatory, and antioxidant properties based on its ethnomedical and traditional uses [61].

➤ **Adusa (*Adhatoda vasica*):**

Adhatoda vasica (Acanthaceae: Family) having a wound healing activity Buffalo calves' spinal columns were cut for the study's purposes, and alcoholic and chloroform extracts of adusa were subsequently applied in a administered in powdered form. The healing of the calves treated with adusa was significantly better than that of the control group. Adusa's function in wound healing tissue was investigated; it demonstrated enhanced extensibility, absorption, tensile strength, and breaking strength. Furthermore, adusa-treated mice had higher amounts of zinc, elastin, collagen, hydroxyproline, and hexosamine [62].

Forest champa (*Spermadietyon suaveolens*):

Spermadietyon suaveolens Roxb. (*S. suaveolens*) belongs to the Magnoliaceae Family, is a medicinal shrub species that is found in the Indomalayan region and is a member of the Rubiaceae family. It can reach a height of 12 feet in China and northern Pakistan [63]. It can also be grown as a decorative in the garden. Ancient medicinal systems used it to treat gastrointestinal issues (constipation, dysentery,

vomiting, cholera, stomachache, colic, and wounds) as well as dermatological illnesses (cuts, wounds, boils, foot cracks, and burns) [64]. According to research, *S. suaveolens* leaves are more efficient against wounds, cholera, and diarrhea [65].

➤ **Asthma weed (*Euphorbia hirta*):**

Euphorbia hirta linn. (Family: Euphorbiaceae, Species: *Euphorbia hirta*) is a tiny annual herb with hairy stems that can grow up to 50 cm in height. It is referred to as barokhervi in Bengali and baridudhi in Hindi [66]. The 1985 African Pharmacopeia linn. As an authorized medication [67]. The hotter regions of Australia and India are home to *E. hirta*, which is frequently found in waste areas by the sides of roadways [68]. *Euphorbia hirta* leaves are used in traditional Indian medicine to treat wounds, kidney stones, coryza, cough, asthma, bronchial infections, intestinal problems, helminthic infestations, and abscesses. Anxiolytic, analgesic, antipyretic, and anti-inflammatory properties are demonstrated by the aqueous extract [69].

➤ **Jungle flame (*Ixora coccinea*):**

Ixora coccinea (*I. coccinea*) belongs to the Madder Family, is well-known medicinal plant was found across the East Indies at elevations of 1,300 meters above sea level in both tropical and subtropical regions. sea level, such as Sri Lanka and Caribbean India [68]. Due to this circumstance, we had to look for a therapeutic plant with dual activity (antimicrobial activity and wound healing) may be amazing and very helpful in the treatment of antibiotics. The current study evaluates the ethanolic root extract of *I. coccinea*'s ability to heal wounds. Other root extracts from *I. coccinea*, including ethanol, aqueous, petroleum ether, benzene, chloroform, and ethyl acetate, were used in antimicrobial investigations for opportunistic wound infections [70].

➤ **Indian olive (*Olea europaea*):**

Olea europaea L. (olive tree) belongs to the Oleaceae Family, is Mediterranean region is home to the significant. Olive extract is promoted as a natural remedy with a variety of health advantages [71]. affirmation was obtained. focus on the extract's antioxidant activity and the associated health advantages, such as chemo preventive and cardioprotective properties. Additionally, the leaves are significant because of their secondary metabolites, which include the secoiridoid chemicals oleacein and oleuropein, which have hypotensive and hypoglycemia effects, respectively [72]. Numerous studies have reported the antibacterial effectiveness of olive leaf extracts against methicillin-resistant *Staphylococcus aureus*, as well as its ability to decrease blood pressure in animals. An ointment made from the extract of olive leaves is applied to cuts and wounds to hasten their recovery. In Portugal, Bulgaria, and Italy, leaves were used to treat burns [73]

➤ **Trumpet tree (*Cecropia peltate*):**

Cecropia peltate (Urticaceae: Family) was Wound Healing Potential in Leaves by Using an excision wound model in rats, the study assessed the effects of topical and oral administration of aqueous and ethanol leaf extracts on wound healing. The control was 1% carboxymethyl cellulose. The amounts of protein, hydroxyproline, and hexosamine in the tissue were measured. Along with biochemistry and tissue histology results that were consistent with improvements in the therapy group, the results demonstrated a statistically significant ($p < 0.001$) decrease in wound areas [74]

➤ **Maidenhair (*Ginkgo biloba*):**

Ginkgo biloba is a very special and old tree species that is notable for both its evolutionary history and its potential for medicinal use. It is the kingdom's property. Plantae, class Ginkgoopsida, order Ginkgoales, family Ginkgoaceae, division Ginkgophyta, and is the only extant species in its genus. Its characteristic fan-shaped leaves are one of its most identifiable characteristics. *Ginkgo biloba* generates male and female reproductive parts on different trees since it is a dioecious plant. The plant having the antioxidant, antimicrobial activity. This sturdy tree, which was once native to China, is now grown all over the world in temperate regions and thrives in places with well-drained soil [75].

➤ **Common wireweed (*Sida acuta*):**

Sida acuta belongs to the Malvaceae family and is widely distributed in tropical regions. Traditionally, this plant has been used in folk medicine for the treatment of several health conditions including malaria, ulcers, fever, gonorrhoea, inflammation, poisoning, and breast cancer. It is also used as livestock feed and is known for its ability to stop bleeding and promote the healing of sores and wounds. Various pharmacological studies have reported that *Sida acuta* possesses multiple biological activities such as antimicrobial, antioxidant, antiplasmodial, cytotoxic, and thrombolytic effects. The present study aims to evaluate the wound healing potential of *Sida acuta* using excision and incision wound models in guinea pigs. [76]

➤ **Drumstick tree (*Moringa oleifera*):**

Moringa oleifera Lam (*M. oleifera*), a member of the Moringaceae family, is a significant plant that is utilized worldwide for both food and medicinal. Because of its therapeutic qualities, which include antioxidant, antibacterial, antidiabetic, and anticancer effects, among others, it is referred to as a "miracle tree" or "Tree of Life". The leaves, which are used as food and medicine, are thought to be the most active part of the plant, even though all of its parts are active. The ability of the *Moringa* plant to heal wounds is one of its well-known effects. Rats' normal wounds and dexamethasone-suppressed wounds healed more quickly when an aqueous extract of *M. oleifera* bark was applied locally [77].

DISCUSSION:

The present review emphasizes the therapeutic potential of polyherbal antimicrobial creams in wound healing, integrating traditional medicinal knowledge with modern pharmacological insights. Wound healing is a multifactorial process influenced by microbial load, oxidative stress, inflammatory responses, and tissue regeneration capacity. Conventional therapies, although effective, are often associated with limitations such as antimicrobial resistance, adverse effects, and high treatment costs. In this context, polyherbal formulations offer a promising alternative due to their multi-targeted mechanisms of action.

The medicinal plants discussed in this review, including *Aloe vera*, *Curcuma longa*, *Azadirachta indica*, and *Ocimum sanctum*, are rich in bioactive phytoconstituents such as flavonoids, tannins, saponins, terpenoids, and alkaloids. These compounds collectively contribute to antimicrobial, anti-inflammatory, antioxidant, and collagen-stimulating activities, which are essential for effective wound repair. The synergistic effect of multiple herbs in a single formulation enhances therapeutic efficacy compared to single-drug treatments.

Furthermore, polyherbal creams provide a suitable topical delivery system that ensures localized action, reduced systemic toxicity, and improved patient compliance. The ability of these formulations to inhibit common wound pathogens such as *Staphylococcus aureus* and *Pseudomonas aeruginosa* highlights their importance in preventing infection and promoting faster healing. However, despite promising preclinical findings, there remains a gap in translating these outcomes into standardized clinical applications.

SCOPE OF THE STUDY:

This review provides a comprehensive overview of polyherbal antimicrobial creams and their role in wound healing. The scope of this study includes:

- Compilation of medicinal plants with proven wound healing and antimicrobial properties
- Analysis of phytochemical constituents responsible for therapeutic activity
- Understanding the role of herbal synergy in enhancing efficacy
- Evaluation of topical polyherbal formulations as alternative wound care therapies
- Highlighting microbiological aspects of wound infections and their management using herbal agents

The study also serves as a scientific foundation for researchers aiming to develop novel polyherbal formulations with improved pharmacological outcomes.

FUTURE PROSPECTS:

Polyherbal antimicrobial creams hold significant promise in

the advancement of wound care management. Future research directions include:

- Standardization of formulations: Establishing quality control parameters for consistency, safety, and efficacy
- Mechanistic studies: Elucidating molecular pathways involved in wound healing and herbal synergy
- Nanotechnology integration: Development of nanoparticle-based or nano-emulsion herbal creams for enhanced skin penetration and bioavailability
- Clinical validation: Conducting well-designed clinical trials to confirm safety and therapeutic effectiveness in humans
- Advanced drug delivery systems: Incorporation of hydrogels, transdermal patches, and bioengineered dressings
- Regulatory acceptance: Developing guidelines for approval of herbal formulations in mainstream medicine
- Combination therapies: Exploring integration with conventional drugs to overcome antimicrobial resistance
- The incorporation of modern technologies with traditional herbal knowledge could significantly transform polyherbal formulations into next-generation wound healing therapeutics.

LIMITATIONS:

Despite the promising potential of polyherbal antimicrobial creams, several limitations need to be addressed:

- Lack of standardization: Variability in plant sources, extraction methods, and formulation techniques
- Insufficient clinical evidence: Most studies are limited to in vitro or animal models
- Complexity of phytoconstituents: Difficulty in identifying and quantifying active compounds responsible for therapeutic effects
- Reproducibility issues: Batch-to-batch variation in herbal formulations
- Regulatory challenges: Limited global acceptance and absence of clear regulatory frameworks
- Stability concerns: Herbal formulations may have shorter shelf-life due to natural constituents
- Potential herb-drug interactions: Risk when used alongside conventional medications

Addressing these limitations is essential for the successful translation of polyherbal creams from traditional remedies to evidence-based clinical therapeutics.

CONCLUSION:

In Summary, current study found that Indians continue to often use traditional medicines. As a result, the study determines the worth of numerous plants utilized in Indian

medicine, particularly in the area of wound healing, may be very interesting for the creation of novel medications. Clearly, there is still a lot to learn about using plants to treat wounds and other illnesses. There haven't been many studies done on specific compounds like Aloe vera, Turmeric, and Garlic that have the ability to heal wounds. These investigations were conducted based on their application in healing therapy and conventional medicine. Based on traditional medicine, a thorough analysis of the plants' ability to heal wounds may yield new substances that might be employed as notable medications used in the treatment of wound healing. This study clearly indicates that it is preferable to begin examining the effectiveness of the natural product from the traditional use rather than attempting to identify the active components of herbs through a large collection of plants from natural sources.

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