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Review Article

Therapeutic effects of medicinal plants on immunology and growth (a review)

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ABSTRACT

Worldwide, medicinal plants are immensely important, both when used on their own and as a complement to conventional medicine. The seeds, leaves, flowers, fruits, stems, and roots of medicinal plants are among their many sections that are rich in bioactive substances. The hydrogen through a chemical reaction from a substance to an oxidizing agent, which produces free radicals. These extremely reactive free radicals set off a series of events that destroy cells. The production of free radicals beyond the body's antioxidant capacity, which causes oxidative stress, has been related to the aetiology of numerous diseases. As a result, research has shifted its attention toward plants that provide natural goods packed with antioxidants that can scavenge and disrupt the negative effects of these free radicals. Numerous plant-produced substances known as phytochemicals that have significant antioxidant activities are beneficial in treating various ailments. The antioxidant capacity of various plants with therapeutic capabilities is advantageous to people, businesses, and healthcare organizations who want to profit from them. We analyzed 250 different plants, including members of the Asteraceae, Combretaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Moraceae, and Malvaceae families. These plants have important biological effects, including anti-inflammatory, antioxidant, immunomodulatory, anti-cancer, and antibacterial characteristics. This review emphasizes the therapeutic and immunological effects of medicinal plants on the growth of vertebrates.

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Introduction

Any plant that has elements that can be used therapeutically or as building blocks to produce effective pharmaceuticals might be considered a medical plant. This definition allows for the differentiation between plants that are considered medicinal but have not yet undergone a full scientific investigation and plants whose therapeutic capabilities and ingredients have been established scientifically. The primary source of natural metabolites, including colors, seasonings, pesticides, and medications is medicinal plants (MPs). Despite the availability of pharmaceuticals, MPs have been used for 5000 years to treat a variety of illnesses in China, India, and Egypt (Jamshidi-Kia et al. 2017). Folk veterinary medicine has traditionally used medicinal herbs to cure or prevent a variety of ailments in farm

animals (Suresh Kumar and Mishra 2004). Herbal products are a valuable source of prospective medications because they frequently include chemical compounds that have a variety of effects, including chemotherapeutic, immune-stimulating, bacteriostatic, bactericidal, antifungal, and anti-parasitic ones (Ahmadi et al. 2012). Numerous studies have been done in the past 20 years to see if herbal medicine may be used to cure and prevent diseases in aquatic animals (Yin et al. 2006). Chemical medication development is dependent on plant-derived monomers (such as morphine, artemisinin, taxol, digital, vinblastine, etc.), and mixed secondary metabolites such as total saponins and tanshinones have potent therapeutic effects (Chopra and Dhingra 2021). Additionally, several well-known MPs, including *Panax ginseng* and *Panax quiquefolium*, which promote cognitive and physical function, have been widely employed in dietary supplements and healthcare items (Liu et al. 2020). The cultivation of medicinal plants, the making of medications, and other therapeutic practices went to monasteries during this time (Table 1). 16 medicinal herbs, including sage, anise, mint, Greek seed, savory, tansy, and others, were the foundation of the treatment regimen used by the doctors-monks. When it comes to herbal medicines, chemometric tools can be used to identify the following in plants: parts processing geographical origin, developmental stages, authenticity, and chemical markers (Gaião Calixto et al. 2023). Numerous plants produce a variety of phytopharmaceutical substances with significant medical, agricultural, and veterinary applications. For example, plants have many practical uses as modern pharmaceuticals and pharmacopoeia agents that are (Ikram et al. 2023). Despite degrading upon contact with water, medicinal plant chemicals have the potential to adversely affect non-target creatures that are more sensitive than fish, including plankton. The 24-hour LC50 of *Melaleuca alternifolia* Cheel extract, for instance, was 80.64 mg/kg against the non-target *Daphnia magna* (Conti et al. 2014).

Therapeutic and pharmacological interest of medicinal plants

Pharmaceutically dynamic bioactive substances found in medicinal plants have an additive and synergistic therapeutic effect that is helpful in the treatment of metabolic disorders. The majority of pharmaceutical medications are created from medicinal plants using the expertise of local populations and the subsequent isolation of the primary active components. The plant material that is utilized to make medicinal cures can serve as a model for the creation of pharmaceutical medications.

Table 1: Commonly found Medicinal Plants and their therapeutic effects.

Medicinal Plant species	Common name	Therapeutic and pharmacological interest	References
Aloe barbadensis miller	Aloe vera	Chemotherapeutic, anti-viral, radioprotective properties, antioxidant, antifungal, anti-inflammatory, antibacterial, anticancer.	(Wynn 2005)
Althaea officinalis	Mars mallow	Soothing, antitussive, immunomodulatory, antimicrobial, demulcent, anti-inflammatory, and many other pharmacological effects.	(Al-Snafi 2013)
Zingiber officinale roscoe	Ginger	Liver and kidney-protecting effects are antineoplastic, antimicrobial and neuroprotective, improving symptoms and biomarkers of metabolic chronic disease, pain and gastrointestinal conditions.	(Crichton et al. 2023)
Allium sativum	Garlic	Antifungal, anti-anemic, antihyperlipidemic, antihypertensive, antimicrobial, antioxidant, antiviral, anticarcinogenic, antiaggregant, and immunomodulatory properties.	(Verma et al. 2023)
Linum usitatissimum	Flax seed	Anti-epileptic, anticancer, anti-inflammatory, neuroprotective, and anxiolytic properties.	(Storozhuk 2023)
Calendula officinalis	Pot marigold	Anticancer, wound healing, antioxidant, antihelminthic, anti-inflammatory, hepatoprotective and antidiabetic properties.	(Shahane et al. 2023)
Broadleaf plantain	Plantago major	wound healing, anti-inflammatory, antiviral agent, antiulcerative and antimicrobial properties.	(Anaya-Mancipe et al. 2023)

Simmondsia Chinensis	Jojoba	Antimicrobial, antipyretic, anti –anti-anti-inflammatory, analgesic, antifungal, antipsoriasis, antioxidant, anti-acne, and antihyperglycemia activities.	(Gad et al. 2021)
Pinus massoniana	Pine pollen	anti-inflammatory, antioxidant, wound healing, and tissue regeneration.	(Zhou et al. 2023)
Curcuma longa	Turmeric	Antibacterial, anti-inflammatory, antibiotic, anti-platelet aggregation, anti-cholesterol activity, and fibrinolytic action.	(Devarathnamma et al. 2023)
Eucalyptus	Gum trees	Antibacterial, anti-inflammatory properties, and antimicrobial properties.	(Alwadi et al. 2023)
Camellia sinensis	Green tea	Anti-inflammatory, anti-proliferation, anti-metastasis syndrome, anti-oxidation antiangiogenic, and anti-metastatic effects	(Oh et al. 2023)
Inula	elecampane	antiproliferative and apoptotic effects, anticancer, antitumor, antioxidant,	(Kheyar-Kraouche et al. 2023; Yıldırım et al. 2023)
Matricaria chamomilla	Scented mayweed	Anxiolytic, sedative, antiallergic, protective hypotensive, antidepressant, anticonvulsant, antidiarrheal, antidiabetic, hypolipidemic antiparasitic, antispasmodic, antimicrobial, anticancer, antioxidant, reproductive anti-inflammatory, antiulcerogenic and analgesic.	(Al-Snafi and Hasham 2023)
Lavandula angustifolia	Lavender	Antibacterial, antimicrobial, antidiabetic, neurologic, antiparasitic, antifungal, and analgesic effect.	(Batiha et al. 2023)
Ginkgo biloba	Maidenhair tree	Oxidative stress, neuroinflammation; anti-inflammatory and anti-apoptotic agents.	(Akanchise and Angelova 2023)
Peppermint	Minha	Anticancer, antibacterial, antiviral, anti-inflammatory, and antioxidant properties.	(Naksawat et al. 2023)
Ocimum tenuiflorum	Holy basil	Anticancerous, anti-inflammatory, antioxidant, and antimicrobial properties.	(Hasan et al. 2023)
Azadirachta indica	Neem	Antihyperglycemic, anticancer, antiviral, antibacterial, antifungal, anti-inflammatory, and antioxidant potential.	(Devi and Sharma 2023)

Therapeutic effects

Effects on immunology

Immunological homeostasis requires immunological control to be kept in check. Numerous diseases and disorders are impacted by immunoregulatory aberrations. There is growing evidence that medical plants, related monomers, and formulations have immunomodulatory effects. These effects include stimulation of immune cells, immunological organs, and cytokine production such as Interleukin (IL-1, IL-2 and others), tumour necrosis factor (TNFα and β), Interferon (INFF α, β and μ), which are an important part of the immune system and helpful in the communication within the cells, even they are involved in the disease and healthy animal through pathological and physiological impacts. They also play a role in mediating natural immune response and are involved in the growth, differentiation and activation of leukocytes, lymphocytes, and a few other cells (Fig. 1). Similarly, cytokines have a role in the stimulation of hematopoiesis and regulate inflammation and inhibition of inflammation such as phytochemicals and their constituents acts in an anti-oxidative and radical scavenging manner, they can modulate the activities of different cells related to inflammation including mast cells, lymphocytes, neutrophils and macrophages, changes in the activities of proinflammatory enzymes including phospholipase A2 (PLA2) Lipoxigenase (LOX), cycloxgensase (COX) and enzyme involved in the synthesis of Nitrix oxide synthase (NOS), modulate the production of some other proinflammatory molecules and modulate the proinflammatory gene expression, allergies by providing supressing effects on the production of IgE and participate in the blocking of histamine action as a result the expression and regulation along with release of adhesion molecules, inflammatory medicators, chemokines and cytokines is controlled (Bellik et al. 2013), and autoimmune disease. Original research pieces and review papers on medicinal plants and immune control are presented in this special issue (Al-Snafi 2016). It has been discovered that Moringa extract administered orally for 50 days has antibacterial activities against *Aeromonas hydrophila*, as well as immune system booster and growth-promoting

effects in Gibel carp (Zhang et al. 2020). Common carp immune-related traits, such as total serum protein, globulins, lysozyme activity, lymphocyte production, and WBCs, were improved by Russian olive extract in the diet (Hoseini et al. 2021).

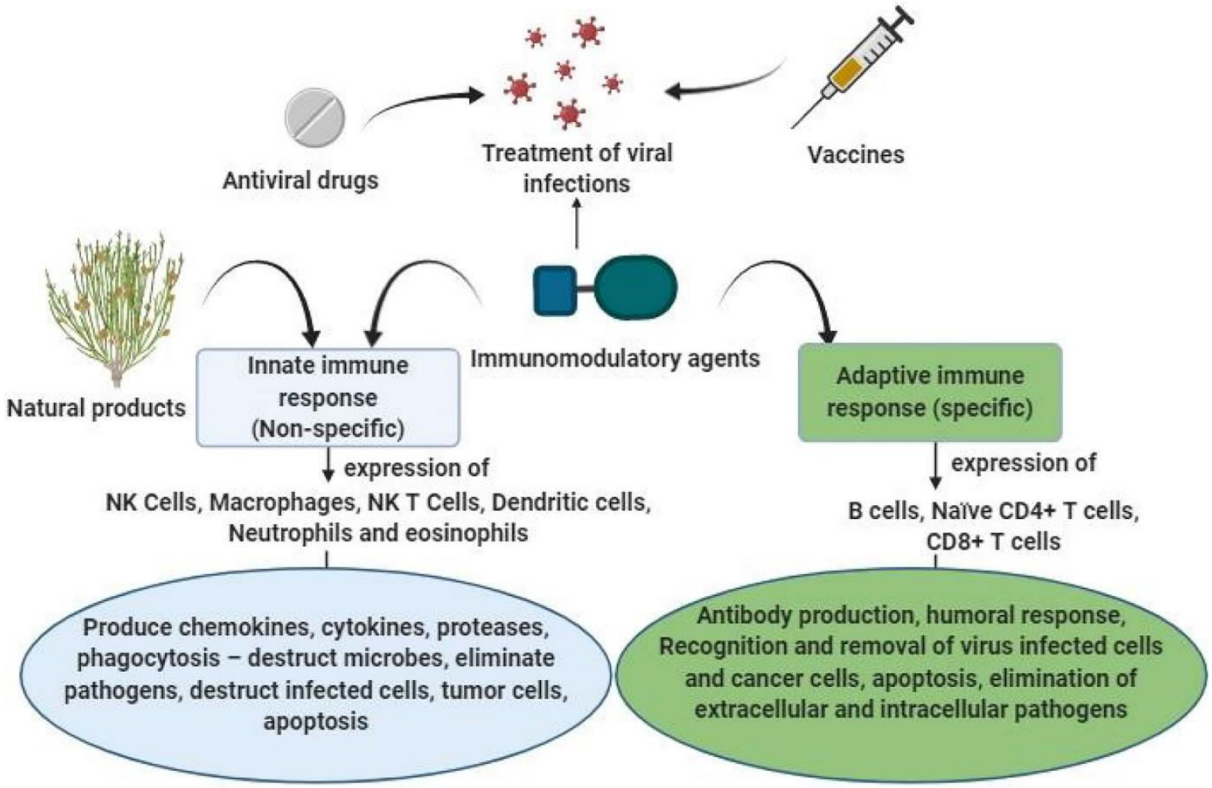

Fig. 1: Possible role of natural immunomodulators for prevention and treatment of viral infections (Alhazmi et al. 2021)

Effects on hematology

After 60 days, high @ 4% /kg feed *A. vera* extract dosages have been used in Nile tilapia, with reports of anemia (Gabriel et al. 2015). Low dosages of A. Vera diet (5, 10, and 20 g/kg *A. Vera* in feed) did not statistically differ from the control, while the maximum dose of supplemented *A. Vera* (40g/kg in feed) was linked with decreased RBCs, Hb, and Hct values. Fish fed a food group supplemented with 40 g/kg of *A. Vera* also showed a significantly lower WBC count. An extended overdose of A. Vera extract results in immunosuppression of fish (Harikrishnan et al. 2011).

Effects on hepatotoxicity

The most common hepatotoxicity symptom is liver dysfunction or damage brought on by excessive use of xenobiotics or medications. Alcohol, CCL4, beta galactosamine, thioacetamide, and excessive dosages of some medications (acetaminophen, nimesulide, antitubercular drugs like isoniazid, rifampin, etc.) that affect the liver are examples of hepatotoxicants that are exogenous agents of clinical regression. Hepatotoxins such as carbon tetrachloride, thioacetamide, acetaminophen, and ethanol, among others, may be characterized as intrinsic if their behavior is predictable or if their effects are dose dependent.

Effect on reproduction

Polycystic ovary syndrome (PCOS) is an endocrine disorder that affects one in every 15 women worldwide. This disorder which is mainly characterized by an excess of male hormones (androgens), acne, and hirsutism, can increase movement susceptibility to long-term insulin resistance, miscarriages, or even infertility. Both allopathic and natural remedies for PCOS can act against the conditions underlying the cause (Salmany et al. 2023). It has been noted that chamomiles' anti-spasmodic effects reduce menstrual cramps. Additionally, chamomile's capacity to stimulate leukocytes has led to its use in treating skin diseases like dermatitis. It is also speculated that chamomile may lower the incidence of premature labor in pregnant women (Park et al. 2017). Cinnamon can be used to regulate the menstrual cycle and improve gynecological problems (Heshmati et al. 2021). Herbalists advise using the plant, known as Basal in Jordan, for treating prostate cancer by juicing the bulbs (Alzweiri et al. 2011).

Effect on fertility

Around 8–14% of couples experience infertility globally, a clinical issue with a growing incidence, of which 40–50% are attributable to male infertility (Babakhanzadeh et al. 2020). Previous research revealed that phytosterols can increase sperm counts, improve sperm motility, and lessen sperm reactivity to oxidative stress (Salehi et al. 2021). Another study that treated female rats after mating with Allium cepa juice for 21 days confirmed the antioxidant activity of the herb. The findings revealed that the male pups of the treated female rats had increased sperm motility and viability when compared to the control untreated group, which is due to a decrease in testicular, epididymal malondialdehyde (MDA) level and the protection against testicular oxidative stress (Jeje et al. 2020). The increase in sperm production and the antioxidant activity that lowers the rate of sperm apoptosis were the two factors that were used to explain the effect of the Rashad extract on male fertility (Ibraheem et al. 2017).

Direct and indirect effects of heavy metals on plants

Plants are influenced by a wide range of factors, including their habitat, the soil they are growing in the water that is nearby, temperature, pH, and even other organisms in the area where they are growing (Annan et al. 2013). Because of their involvement in reactions like the Fenton and Haber-Weiss reactions, redox-active metals can lead to oxidative damage. These impacts of reactive oxygen species (ROS), also known as oxygen-free radical species, are caused by their formation during this process within plants.

1. Disruption of cell homeostasis
2. Protein disintegration
3. DNA strand rupture
4. Cell membrane and photosynthetic pigment degradation (Sáez et al. 2016).

Among the barley species belonging to the Allium genus, lead also prevents the growth of the roots, stems, and leaves. Factors including the amount of lead present, the medium's ionic composition, and pH affect how much root growth is inhibited (Rout et al. 2000). Lead has an impact on a variety of biochemical processes in maize, including reduced germination, slowed growth, decreased plant biomass, and decreased protein content (Annan et al. 2013). Chromium-induced oxidative stress the breakdown of photosynthetic pigments, which in turn slows down growth and development.

***In vivo* effects**

Excision, incision, and burn experimental animal models with or without infection using mice, rats (diabetic and non-diabetic), and rabbits throughout the past five years. The influence of various plant extracts and wholly natural substances on healing wounds. They actively combat reactive oxygen species (ROS), and the anti-inflammation and antibacterial properties they process aid in the healing of wounds. Adding bioactive natural products to wound dressing made of bio- or synthetic polymers as nanofiber, hydrogel, film, scaffold, and sponges produced encouraging results in some stages of the wound-curing process, including growth, re-epithelialization, hemostasis, inflammation, and remodeling (El-Sherbeni and Negm 2023).

***In vitro* effects**

Chinese herbal remedies (CHMs) have long been used extensively during pregnancy to treat symptoms, including morning sickness (Flaws 2005). To address pregnancy-related issues, particularly to avoid early gestational miscarriages (Klose et al. 2023). The most common polyphenolic chemicals in the human diet are flavonoids, which have been shown to have anti-diabetic benefits in several laboratory and animal studies. Their antioxidant, anti-inflammatory, and immune-modulating qualities are thought to be responsible for these effects. Recent tests carried out an important group of natural food components, may potentially reduce diabetes (Fig. 2). They might behave similarly to flavonoids in this situation in terms of how they act (Jin and Arroo 2023).

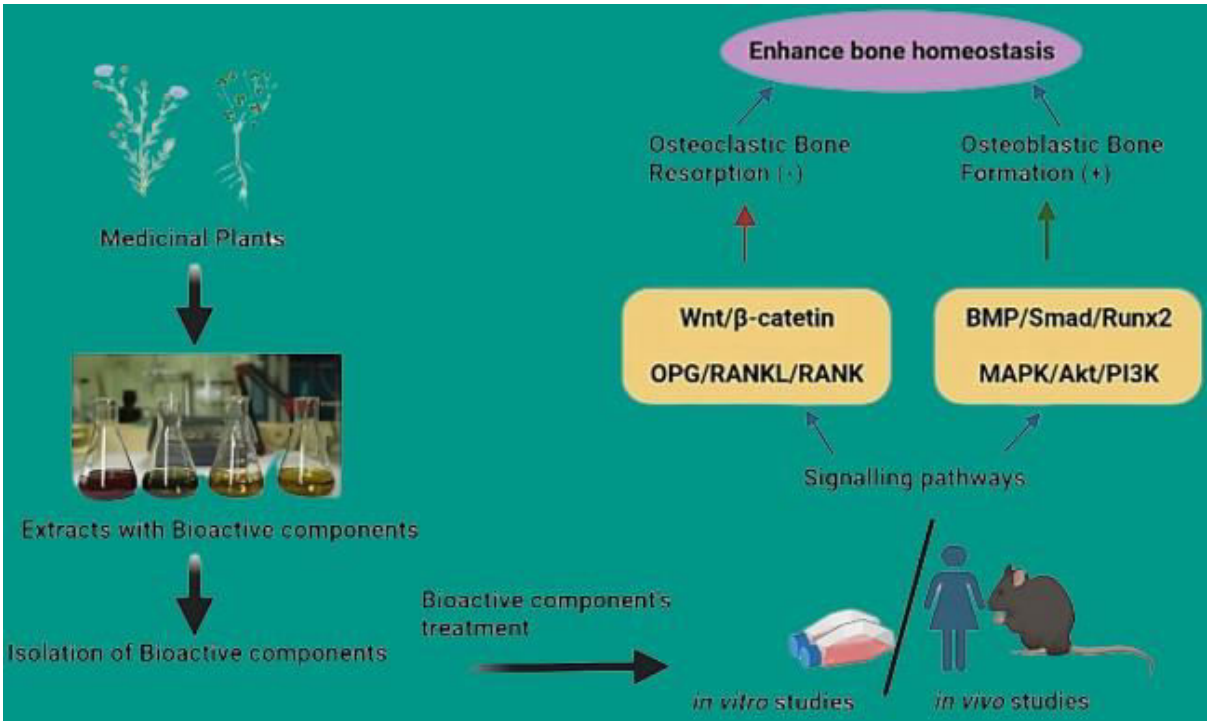

Fig. 2: Graphical representation of anti-osteoporotic effects of medicinal plants (Kumari et al. 2023)

Plant as a wound healer

Homeostasis, inflammation, proliferation, and remodeling are just a few of the cellular processes that support the dynamic process of wound healing. For the healing of damaged tissue to be successful, all mechanisms must work in harmony. Following cutaneous damage, there is a susceptibility to microbial infiltration into the subcutaneous tissue, which could lead to chronic wounds and life-threatening infections. For the treatment of wounds and the prevention of infection, natural phytomedicines with significant pharmacological activity have been used widely and successfully. Since ancient times, phytotherapy has proven effective in treating cutaneous wounds, preventing the spread of infections, and reducing the need for medications that contribute to dangerous antibiotic resistance. (Fig. 3)

Fig. 3: Pharmacological wound healing activities of some remarkable medicinal plants. 1: Jojoba, 2: Calendula officinalis, 3: Eucalyptus, 4: Chamomile, 5: Inula, 6: Plantago major, 7: Althea officinalis (Albahri et al. 2023).

Plants such as *Curcuma longa, Matricaria chamomilla, Althaea officinalis, Aloe vera, Calendula officinalis, Achillia millefoliium*, and various others have a long history of utilization in the Northern Hemisphere for the management of wounds.

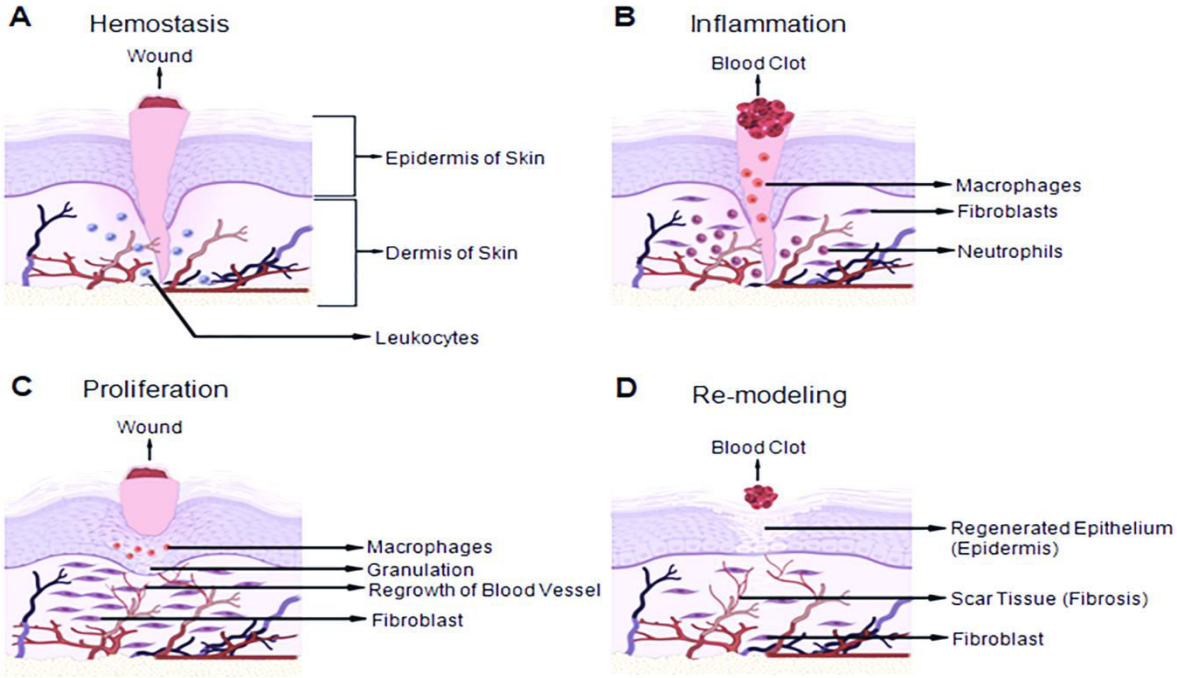

Fig. 4: The stages of homeostasis, inflammation, proliferation, reepithelialization, and remodeling in the wound healing process. These stages entail the interrelated movements of several cell types with various activities (Albahri et al. 2023)

Effects of medicinal plant on growth

In aquaculture, it is ideal to employ naturally occurring dietary supplements to boost fish development and immunity and lessen the need for synthetic antibiotics. In this study, a chelated mineral supplement called Bonzafish was added to the diet of rainbow trout together with four medicinal plants (caraway, green cumin, dill, and anise). Overall, they showed that fish eating a diet with 50% of the conventional inorganic minerals premix replaced with 1 g/kg Bonzafish exhibited no significant difference when compared to the control in terms of growth performance, showing a positive potential for chelated minerals in aquaculture. Additionally, fish from Z-20 treatments (20 g/kg of plant mixture plus 1 g/kg Bonzafish) displayed the greatest overall outcomes in terms of assessed growth, immunology, and antioxidant characteristics. This is an initial attempt to replace conventional mineral premix with a chelated minerals source that contains eight crucial trace minerals together with a variety of medicinal herbs (Rashidian et al. 2023).

Overview of medicinal plants

To promote wound healing, hydrogels based on aloe vera have recently made significant strides (Chelu et al. 2023). This study presents a thorough summary of these developments. Aloe vera-based hydrogels' synthesis techniques, structural details, and functionalities are covered. Analysis is also done on the diffusion, swelling, and degradation mechanisms of the medicinal compounds released from aloe vera-based hydrogels. Additionally, the anti-inflammatory, antibacterial, and tissue-regenerating benefits of aloe vera-based hydrogels on wound healing are highlighted Nagini et al. (2023) reported that *Azadirachta indica*, the neem limonoids exert anticancer effects by preventing the acquisition of hallmark traits of cancer, such as cell proliferation, apoptosis evasion, inflammation, invasion, angiogenesis, and drug resistance. Neem limonoids are a valuable addition to the armamentarium of natural compounds that target aberrant oncogenic signaling to inhibit cancer development and progression. Ajaykumar et al. (2023) demonstrated that the Ocimum tenuiflorum, holy basal or Tulsi along with some of its phytochemicals- including eugenol, apigenin, retinal, sitosterol, rosmarinic acid, carnosic acid,

and luteolin- prevent chemically induced oral, gastric, cervical, skin, liver, and lung cancer. These effects are mediated by increased antioxidant properties, inhibition of angiogenesis and metastasis, induction of apoptosis, and altered gene expressions. They also demonstrated via scientific studies to have immunomodulatory, anti-inflammatory, antidiabetic, hypolipidemic, antipyretic, analgesic, hepatoprotective, and stress-relieving properties (Xue et al. 2023). This research focuses on the extraction and purification processes for polysaccharides obtained from the seeds, roots, leaves, and flowers of *Althaea officinalis*. It also explores the characterization of their chemical makeup, biological characteristics, structure-activity correlations, and the various ways *Althaea officinalis* polysaccharides (are used in various sectors. *Althaea officinalis* polysaccharides, a vital bioactive ingredient in *Althaea officinalis*, possess a wide range of pharmacological activities, including antitussive, antioxidant, antibacterial, anticancer, wound healing, immunomodulatory, and infertility therapeutic effects. Over the past 50 years, AO has successfully yielded many polysaccharides (Sari et al. 2023). Found that peppermint aromatherapy helps improve cardiovascular disease disorders through its analgesic, anxiolytic, sedative, and sleep-enhancing properties. Cardiologists can use peppermint aromatherapy as an alternative therapy to reduce fatigue, pain, anxiety, nausea, and vomiting and improve sleep quality in patients with cardiovascular disease. (Shamabadi et al. 2023) Suggested a variety of lavender delivery techniques for reducing anxiety, including inhalation, massage, and oral approaches. Both the 80 mg and 160 mg oral doses were beneficial, though the higher dose was more efficacious. Preparative patients, cardiovascular patients, hemodialysis patients, cancer patients, dental patients, and pregnant women were just a few of the many subjects studied (Chavan and Salve 2023). Studies on the advantages of encapsulated turmeric for enhancing absorption and efficiency. It has been demonstrated that encapsulation methods, including liposomes, solid lipid nanoparticles, and nano emulsions increase the bioavailability of turmeric by preventing the active ingredients from degrading and enhancing their absorption in the body. Additionally, it has been seen that using these methods lengthens the favorable benefits of turmeric. Crichton et al. (2023) suggested a mechanism of action for ginger's health effects on people. According to studies, ginger may help reduce the symptoms and biomarkers of gastrointestinal problems, chronic metabolic illness, and pain. These results are backed up by mechanistic studies and human clinical trials. Additionally, it has been discovered that the bioactive components in ginger have several advantageous benefits, such as lowering blood pressure and promoting vasodilation. Additionally, they reduce the activation of serotonin, muscarinic, and histaminergic receptors to lessen nausea and vomiting and inhibit the synthesis of cholesterol, which helps control blood lipid profiles, facilitate the translocation of glucose transporter type 4 molecules to plasma membranes for improved glycemic control, promote the breakdown of fatty acids for weight management, and inhibit the synthesis of glucose transporter type 4 molecules (Zugaro et al. 2023). Aged Garlic Extract (AGE) was proposed as a potential option to regulate cytokine release, phagocytosis, and macrophage activation to maintain immune system homeostasis. It makes sense to investigate AGEs therapeutic effects for the management and prevention of chronic inflammatory bowel illnesses (IBD) given its immunoregulatory capabilities. Immunological dysregulation is a significant factor in the initiation and progression of several diseases, such as acute gastroenteritis (AGE), presenting a potential avenue for therapeutic interventions. Talebi et al. (2023) demonstrated the Inula species and their phytochemical components have been used medicinally for their pharmacological activity, particularly their neuroprotective properties. The effects on pharmaceuticals, cosmetics, and the environment are discussed in detail, as well as how important they are to food science. This genus's pharmacokinetic characteristics, safety, and toxicity are also discussed (Chaudhary et al. 2023). Epicatechin gallate (ECG), epicatechin (EC), epigallocatechin gallate (EGCG), and epigallocatechin (EGC) have been identified as the four key flavonoids in tea that make up its principal polyphenols. Tea exhibits a range of valuable biological properties with potential applications in various diseases, including antidiabetic, antifungal, anti-obesity, neuroprotection, anti-pigallocatechin, antibacterial, antiviral, and antiglaucoma activities. However, the limited absorption and low bioavailability of bioactive compounds from *Camellia sinensis* hinder its medicinal potential. To enhance therapeutic efficiency, further human chemical studies and the utilization of advanced nanoformulation techniques involving nanoparticles for targeted delivery of phytochemical components will be necessary. Zhakipbekov et al. (2023) reported that the antibacterial, antiviral, antifungal, anti-inflammatory, and wound healing capabilities of *Plantago major* plant extracts show a wide range of therapeutic possibilities and offer a great deal of potential for usage as a pharmaceutical raw material. El Gendy et al. (2023) drew attention to earlier studies on phytochemicals, the therapeutic uses of jojoba oil and other plant parts, and the numerous strategies for meal detoxification.

Jojoba oil is mostly made up of wax esters (97%) as well as fatty acids, fatty alcohols, sterols, and a small amount of vitamin E. Jojoba has a lengthy traditional history. Folklore suggests using it to treat obesity, dysuria, and colds. Numerous recent research has shown its medical and pharmacological effects, including antioxidant, anti-inflammatory, antibacterial, anticancer, anti-acne, anti-psoriasis, wound healing, and hepatoprotective actions (Sarfraz and Ahmad 2023). *L. usitatisimum* has been demonstrated in research to possess antioxidant, anti-inflammatory, immunomodulatory, anticancer, antitumor, antimicrobial, anti-inflammatory, analgesic, anti-lipidemic, wound healing, hepatoprotective, cardioprotective, and additional protective actions. The medicinal properties of flax and its ability to prevent disease have also been extensively reported. Investigations were also conducted on the use of *L. usitatissimum* in medicine formulations, diet, food items, and nano based methods. Zadak et al. (2023) suggested that chamomile can lessen flatulence and may have therapeutic benefits for the gastrointestinal system. The prevalence of postoperative flatulence following laparoscopic procedure appears to be decreased when chamomile drops are used as a prophylactic medication. Wang et al. (2023) studied that are the first to examine the effects of intestinal immunity, serum metabolomics, and intestinal flora *on Pinus yunnanensis* pollen polysaccharides (PPM60) and sulfated polysaccharides (SPPM60) on ulcerative colitis (UC) may lay the groundwork for the use of plant polysaccharides as an adjuvant clinical treatment for UC.

Conclusion

Each of the plants we have looked at has complicated chemical properties that are linked to a variety of pharmacological actions. Anti-microbial, anti-inflammatory, and antioxidant activities are three of these distinctively similar traits. Herbal medicines, which heal wounds more effectively and with fewer side effects, may provide the basis for future pharmaceuticals. Topical or systemic application of phytotherapeutic medicine alone or in combination with other wound-healing agents should be taken into consideration, especially when treating patients with different diseases, we studied their immunological effects in animals and humans as well as their different applications used in different fields nowadays.

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Ethical statement

This study required no ethical approval.

Availability of data and material

The data can be obtained from the corresponding author on a reasonable request.

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Consent to participant

All the authors gave their consent for equal participation.

Competing interest

The authors declare that they have no relevant financial or non-financial interest to disclose.

Author contribution

MTSK, ZK, SM, and MA wrote the manuscript AM and NUK managed figures and references.

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