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A Review on Neglected Weed: Chromolena Odorata with Pharmacological Properties

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ABSTRACT:

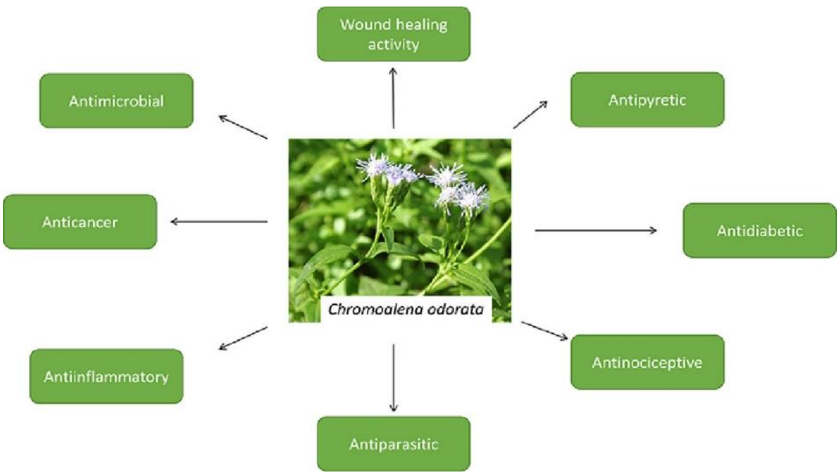
The study of plants that can heal wounds has evolved into an interdisciplinary field with a methodical investigative methodology. Antioxidants and cytokines are only two examples of the biochemicals that the body uses to mend itself. Even if there are many pharmacological preparations and formulations for wound care and management, it is still important to look for effective therapies because some of the present formulations have negative side effects or are ineffective. Many plants may have beneficial impacts on various stages of the wound healing process via a variety of mechanisms, according to phytochemicals or biomarkers from those plants. Numerous herbal remedies have demonstrated significant efficacy in the treatment of wounds, and a number of natural substances have demonstrated in vivo wound healing potential. As a result, they can be regarded as potential natural drug sources. R.M. King and H. Robinson's Chromolaena odorata (L.)

Tropical weeds include Chromolaena odorata (L.) R.M. King and H. Robinson. However, it demonstrates appreciable levels of anti-inflammatory, antipyretic, analgesic, antimicrobial, cytotoxic, and a host of other pertinent medicinal properties. As a result, it is well-known in some regions of the world as a traditional medicine used to treat a variety of illnesses. This plant has to be professionally evaluated in light of the available literature in order to comprehend its precise function as nature's gift for curing wounds and its contribution to accessible healthcare. This review aims to provide an overview of the role of C. odorata and its biomarkers in biological systems' wound healing processes, which is important for its potential use in the design, development, and application of new drugs for the treatment of wounds in the future.

KEYWORDS: Chormolena Odrata, Traditional Uses, Pharmacological properties, invasive weed, Antimicrobial and Antifungal.

INTRODUCTION:

Physical injuries known as "wounds" can be either "open" or "closed," depending on the underlying cause, and either "acute" or "chronic," depending on how the wound heals physiologically (1–3). The repair of compromised anatomical integrity and altered function of the affected area depends on wound healing (4,5). Initiated in reaction to an injury, healing is a difficult and comprehensive process that aims to repair the function and integrity of the injured tissues (6). Patients and medical professionals are very concerned about chronic wounds since they affect so many people and drastically lower their quality of life (7).According to recent estimates, 6 million people globally have chronic wounds (7, 8), while severe wounds in the US cause more than 300,000 hospital admissions each year (7,8).



The primary goal of high-quality wound rehabilitation is the healing of the injured area. The majority of skin injuries are surgical wounds, with about 80% of these wounds requiring the use of sutures, staples, or tape. Numerous wound management techniques also make use of hemostasis products, fabric bandages, and surgical dressings (9,10).

Hemostasis, inflammation, proliferation, and remodelling are the four rigorously regulated phases that make up the normal biological process of wound healing in the human body (4,6). Hence, a variety of mechanisms, such as inflammation, cell proliferation, and contraction of the collagen lattice, are involved in the healing of wounds (11–13). Moreover, the presence of oxygen free radicals or a microbial infection may hinder the healing process (5,6). All of these processes have been used as targets for improving wound management in the last 15 years by the in vitro assays created to study wound healing.

Since the many stages of the healing process for wounds overlap, the ideal plant-based therapy should affect at least two of these stages before being regarded as having scientific backing for its application (12–14). Due to the possibly chronic nature of injuries and the side effects associated with current medicines, contemporary medicine still struggles to find efficient and affordable remedies for wound healing despite substantial advancements in the pharmaceutical industry (15–19). Plants and their metabolites constitute a significant potential source of biomolecules in the hunt for novel treatment solutions.

Plant-derived wound healing agents

There have been several reports that medicinal herbs offer wound-healing properties (20–28). 80% of the world's population relied on traditional medicine to meet their primary healthcare needs during the 20th century (29). Medicinal plants continue to play a significant role in healthcare as a source of cutting-edge medications, herbal supplements, and dietary supplements. The loss of traditional cultural and natural resources brought on by population growth, urbanisation, and the erosion of botanical knowledge in developing countries may result in the potential permanent loss of such unrecorded knowledge and information. Several ethnic groups, however, have failed to preserve their historical collective knowledge of such medicinal plant use (30). (31).For the treatment of cuts, wounds, and burns, folk and tribal medicine practises use a variety of herbs and animal items (12). While some of these plants have undergone scientific screening to assess their ability to treat wounds in various pharmacological models and on humans, most of these plants' promise has not yet been fully realised (29–31). Therefore, it is crucial to prevent the agents utilised in conventional medical systems from ceasing to exist before they can be thoroughly evaluated and documented (32).

One of the developing fields in contemporary biomedical sciences is the study of wound healing agents (33–37).Scientific evaluation is necessary for medicinal plants to effectively contribute to accessible healthcare; phytochemical screenings are frequently regarded as the initial step in the development of viable medications (38,39). The chemical composition of plants and their bioactivity as it relates to traditional medicine have been studied using successive solvent extraction procedures, chromatographic separations, and spectroscopic methods (32,37). In animal models, a number of secondary metabolites and active chemicals derived from plants have been shown to actively promote wound healing.Important examples include the tannins from Terminalia arjuna (40), the oleanolic acid from Anredera diffusa (41), the polysaccharides from Opuntia ficus-indica (42), the gentiopicroside, swertiamarin, and swertiamarin derivatives from Gentiana lutea (43), the shikonin derivatives (deoxyshikonin, acetyl shikonin, 3- (59).

Inflammation, epithelization, antioxidant defence, biochemical changes (hydroxyproline), granulation, neovascularization, and wound contraction are known to occur during the complicated process of wound healing; however, the precise mechanistic details of this process are still unknown, which poses a significant challenge to the pharmacological validation of wound healing plants. So, most research on medicinal plants is limited to screening plants to just evaluate their effects on healing wounds and look into the molecular aspects.The goal of this review is to assess the current state of knowledge and information about the underutilised and overlooked medicinal plant C. odorata, including its in vitro and in vivo mechanism of action, and to look at the ethnopharmacological claims of the plant's usefulness. This may help promote the acceptability of plant-based wound healing agents worldwide and the understanding of their significant natural function in wound healing. According to a study, these medicinal plants have been used to treat wounds, cuts, burns, and both cuts and wounds in about 31%, 29%, 10%, and 22% of the cases, respectively, of these medicinal plants (27,61).

Chromolaena odorata as nature's wound healer

Linn (L.C.)'s odorata The species C. odorata (L.) King and Robinson, formerly known as Eupatorium odoratum L. Table I, is a member of the kingdom Plantae, subkingdom Tracheobionta (vascular plants), superdivision Spermatophyta (seed plants), division Magnoliophyta (flowering plants), class Magnoliopsida (dicotyledons), subclass Asteridae, order Asterales, family Com (62–67). It is a member of the largest family of flowering plants, which has 13,000 species and 900 genera (62–67). Eupatorium conyzoides Vahl, Eupatorium brachiatum Siam weed ex Wiestr, Eupatorium atriplicifolium Vahl, and Osmia odorata (L.) Schultz-Bip are other names for C. odorata. It is also known by a variety of other names in different nations and languages, including Siam weed, triffid weed, bitter bush, Jack in the bush, Christmas bush, and baby tea.Linn (L.C.odorata)'s species Previously known as Eupatorium odoratum L. Table I, the species C.

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Table :

Minerals	*Chromolaena odorata* (mg/100g)
Calcium	487.40±1.06
Magnesium	116.70±1.01
Potassium	96.91±1.05
Sodium	44.22±1.02
Phosphate	143.15±1.04
Iron	67.71±1.01
Zinc	3.77±0.19
Copper	1.41±0.98
Manganese	0.81±0.10
Chromium	0.97±0.08

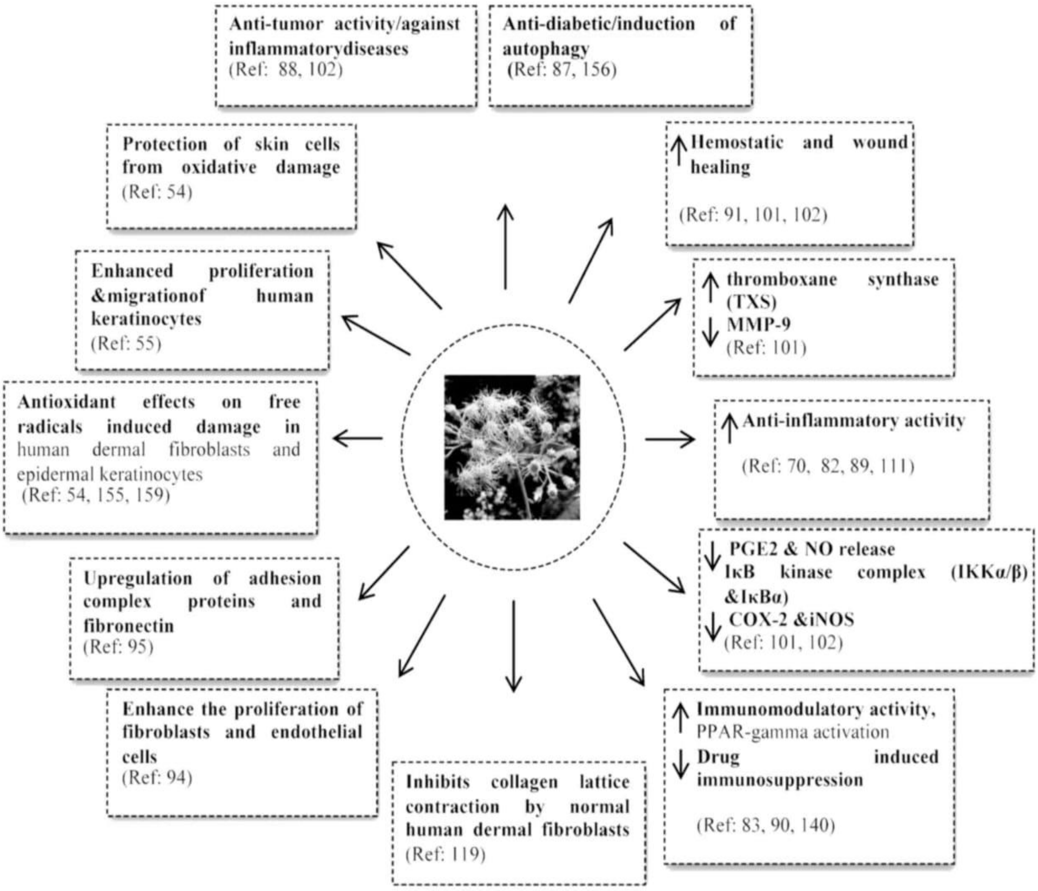
The 1,200 species of small herbs, shrubs, or subshrubs in the genus Chromolaena are primarily found in the Americas, with a limited number also found in tropical Africa and Europe (54,55,67,69,70). There have been discoveries of C. odorata and closely related Eupatorium species throughout Europe, including France, Thailand, China, and Indo-China (54,55,66,69,71). There aren't as many significant economic items generated from the family Compositae as there are from other huge families, including Leguminosae (62,65). In the open, C. odorata, a diffuse, scrambling perennial shrub, reaches heights of 3 to 7 metres (72–75). It is a widespread weed that grows well in most soil types, is abundant in open wastelands and by the sides of roads, and prevents the establishment of other plants (76,77). C. odorata is a toxic plant.

Young plants of the poisonous plant C. odorata have nitrate concentrations that are 5–6 times higher than those that are toxic to wildlife (78). Because to its invasive nature, it is viewed as a threat because it has an impact on plantations and other ecosystems (66,79).C. odorata has been noted to have antibacterial, antiplasmodic, antiprotozoal, antitrypanosomal, antifungal, antihypertensive, anti-inflammatory, astringent, diuretic, hepatotropic (54,55,66,80-82), immunomodulatory (83) and anticancer effects. These effects are depicted in Fig. 1. (84–90). Moreover, it is given topically as a remedy for the common marine catfish's spine sting (86). In Vietnam and other tropical nations, fresh leaves or a decoction of C. odorata have long been used as a treatment for leech bites, soft tissue wounds, burn wounds, skin infections, rashes, diabetes, and periodontitis, as well as an insect repellent (54,55,91–93). The leaves are traditionally used as a poultice to halt bleeding and speed up healing from cuts and wounds (69,76,93). The usage of Eupolin, a Chromolaena species product, has already been authorised in Vietnam.

Vietnam has already granted permission for the use of Eupolin, a substance derived from Chromolaena spp., to treat soft tissue burns and wounds (69,94–97). A leaf extract mixed with salt is used as a gargle for colds and sore throats, while an aqueous infusion of the roots is used as an antipyretic and analgesic medication (69). Traditional herbal remedies for burns, soft tissue wounds, and skin infections include fresh leaves and extracts of C. odorata, which can be found in Thailand, India, and Vietnam, among other developing nations (81,94,96).

Chemical constituents of Chromolaena odorata

In several chemical analyses of C. odorata L., constituents such as monoterpenes, sesquiterpene hydrocarbons, triterpene/steroids, alkaloids, and flavonoids have been identified (98–100). It has been discovered that this plant's leaves are a good source of the flavonoids quercetin, sinensetin, sakuranetin, padmatin, kaempferol, and salvagenin (86,98). Additionally, C. odorata leaves have the highest amount of isolated allelochemicals found in any plant (98). According to a study conducted in Vietnam, the leaf's aqueous extract contains numerous trace elements as well as flavonoids (salvigenin, sakuranetin, isosakuranetin, kaempferide, betulenol, 2-5-7-3 tetra-o-methyl quercetagetin, tamarixetin, two chalcones, and odoratin and its alcoholic compound), essential oils (gey (99).Another investigation by Heiss et al. (100) revealed that the crude ethanol extract of C. odorata contains complex mixtures of lipophilic flavonoid aglycones and phenolic acids (protocatechuic, p-hydroxybenzoic, p-coumaric, ferulic, and vanillic acids) (flavanones, flavonols, flavones and chalcones). 17 compounds have been isolated from C. odorata studies so far, including 5a, 6, 9a, 10 pentahydro-10 hydroxy-7 methyl anthra[1,2-d]. [1,3]dioxol-5-one, 1,2-methylenedioxy-6-methylanthraquinone, 3-hydroxy-1,2,4-trimethoxy-6-methylanthraquinone, and 7-methoxy-7-epi-medioresinol are among the 12 known compounds. Other compounds include odoratin, 3-acetyloleanolic acid, ursolic acid, ombuin, 4,2′-d (99). The chemical structures of a few significant bioactive substances found in C. odorata are shown in Fig. 2. These substances include stigmasterol, scutellarein tetramethyl ether (Scu), flavonoids (98, 99, 101, and 102), and the phytoprostane compound chromomoric acid C-1 (100).



Conclusion :

Despite the fact that C. odorata displays a wide range of pharmacological activities, understanding wounds and identifying their known and unidentified chemical components are difficult tasks in the field of wound healing. Researchers have been examining the healing capacity of C. odorata for more than 30 years in an effort to support the inclusion of this plant in the management strategy of wound healing. In order to better understand the advantages of C. odorata and contribute to evaluations of its usefulness as claimed by the communities that use it for its wound-healing properties, this review has attempted to summarise these findings. Despite being widely accessible, the plant is largely recognised as a dangerous weed globally.Yet, it has been anticipated that medicinal plants and herbs are likely to be the focus of medical treatment in the future due to the rising global interest in them. Further study is anticipated to look at the purified constituents to better understand the mechanisms underlying C. odorata's wound healing activity because C. odorata and its constituents have shown to be beneficial in enhancing wound healing activities. Translational clinical trials may eventually result from the preclinical research that is planned. Since C. odorata has been shown to be safe for use (84–85), further research into its efficacy as a wound-healing agent for internal and external wounds, including gastric ulcers, is necessary to determine whether it has the potential to offer wound management services at an affordable cost.

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