

Review Article

Some Aromatic Plants Used in Wound Treatment in Complementary Medicine and Their Usage Methods

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Abstract

Phytotherapy is a term used for treatment with plants. Since ancient times, plants have been used in the treatment. Today, the vast majority of medications used for treatment are herbal in origin. In traditional medicine, plants and herbal products are used extensively in the treatment of wounds and burns. It is known that plants have antibacterial, proliferation stimulating, fibroblast stimulating and antioxidant effects on wound healing. Currently, interest in herbal treatment is growing every day, and herbal methods used in traditional medicine are being studied. Special production areas are created for some plant species used for treatment purposes and their oils are extracted or dried products are prepared for use. In this article, current studies were examined to determine the effects of Aloe vera, Calendula officinalis, Panax ginseng, Achillea millifolium, Hypericum perforatum, Momordica charantia, Inula viscosa, Pinus nigra L., Pinus nigra L., Arnebia densiflora, Centaurium erythraea, Micromeria congesta, Plantago major L. and Nigella sativa L. plants, which are used in wound treatment in traditional folk medicine, on wound healing. It has been observed that these plants have herbal medicine potential that can be used in complementary medicine applications.

Keywords: *Phytotherapy, Plant, Burn, Wound treatment.*

1. Introduction

Phytotherapy is the term used for the medical treatment method made with herbal products. The term "Phytotherapy", which means "treatment with medicinal plants", was first used by the French physician Henri Leclerc (1870-1955) in the journal "La Presse Medicale" published in 1939. Since ancient times, human being

have turned to plants to treat diseases and used them successfully in the treatment of diseases. The biggest difference between in the past and today's phytotherapy applications is that only the useful parts of the plants are used for treatment purposes, not the whole. In the past, in order to benefit from the therapeutic effect of the essential oils of the plants, the tea was

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made and drunk. Today, essential oils of many plants are extracted and used in the treatment of diseases. Thus, useless or side-effect parts of the plant are separated and used safely in patients (1-2).

Throughout history, human being has used and still continues to use plants to treat many diseases such as diabetes, respiratory disorder, and jaundice. While 25% of the drugs currently in use in developed countries are obtained from plants and plant derivatives, this rate rises to 75% in developing countries (3). With the rapidly increase in population and the development of industry, the need for natural resources increases rapidly, and as a result, people's interest in how to benefit from these resources is also increasing. Our country has a very rich geography in terms of natural resources, especially in terms of herbal diversity, and this richness will come to light as researches increase (4).

2. Wound and Injury

Wound is the disruption of normal tissue integrity as a result of physical damage to the tissues by any substance or agent. Erosion, ulcer and fissure terms can also be used instead of the word wound. Erosion is the term used to describe local tissue losses in the epidermis that do not damage the dermis layer. It is not permanent and healing takes place without leaving a scar. Fissures are tissue losses that describe canal-shaped vertical wounds. It can affect the epidermis and/or dermis layers. Ulcers are local wounds characterized by tissue loss in the dermis and epidermis layers (5). Wound healing process occurs as a result of several cellular, physiological and biochemical stages. Wound healing occurs in three basic phases: inflammatory (exudative) phase, proliferative phase and regenerative phase. Inflammatory phase;

After injury, the coagulation system is activated to stop bleeding in the injured area. At this stage, mainly fibrin storage and activation of platelets occur. This phase lasts an average of 3 days. Proliferative phase; granulation tissue formation begins with the induction of growth factors and proteolytic enzymes. The main components of granulation tissue are fibronectin, hyaluronic acid and collagens. With the formation of new vessels, the oxygen demand in the wound area begins to be supplied. The proliferative phase lasts for an average of 10 days. Regenerative phase; this is the phase in which the reepithelialization process begins approximately two weeks after injury. This phase can last up to 2 years (6-7).

3. Plants and Products Used in Wound Treatment

Aleo vera

Aloe vera, which grows in tropical regions with hot and humid climate, has been used in the treatment of burns since ancient times. It has been reported that *Aloe vera*, which is used in different ways, accelerates the healing process of 1st and 2nd degree burns and increases epithelial tissue formation. It has been determined that *Aloe vera* increases vascularization in burned tissues. It has been reported that *Aloe vera* stimulates fibroblasts with the acemanan substance in its structure, increases collagen synthesis and epithelialization, and has antibacterial, anti-inflammatory and moisturizing effects. It has been reported that *Aloe vera* products such as creams and gels are safe in external use without any serious side effects (8). It has been reported that some *Aloe vera* extracts have antioxidant, anticarcinogenic, anti-inflammatory, antidiabetic and

macrophage enhancing properties. In studies with animals with digestive system ulcers, it has been reported that the polysaccharides of the *Aloe vera* plant are effective in the formation of natural immunity and suppress oxidative damage (9-10).

Calendula officinalis

The composition of this plant species, known as *Asteraceae* (*Chamomileaceae*), contains essential oils, resin and phenolic substances. It is commonly used as herbal tea and pomade. *Calendula officinalis* species has been used since ancient times in the treatment of wounds, burns, ulcers and dermatitis. In addition to its immunomodulatory and antibacterial effects, it also has stimulating effects on granulation tissue formation by increasing collagen and glycoprotein synthesis (11). Studies with *Calendula officinalis* L. have been reported to be effective in wound healing by increasing vascularization and epithelialization formation (12). In studies on wound healing with *Silybum marianum*, it has been reported that it reduces inflammation in wounds, accelerates the epithelialization process, protects fibroblasts against hydrogen peroxide, and increases collagen synthesis (13).

Panax ginseng

Ginseng belongs to the *Ivyaceae* (*Araliaceae*) family and is a perennial plant species that sheds its leaves in winter, grows slowly and loves shade. It has been used extensively in China, Korea, Japan and Russia from past to present due to its positive effects on health. It has been reported that ginseng has pharmacological beneficial effects on the central nervous, endocrine, immune and cardiovascular systems (14-15). Ginsenosides, the active ingredient of *Panax ginseng*, which is used as herbal tea, cream and tablet are also

used for the regeneration of epithelial tissue (12-16). It has been reported in animal studies that *Panax ginseng* exerts an anti-inflammatory effect by suppressing the production of cytokines during the inflammation phase, increases the activation, proliferation and migration of keratinocytes and fibroblasts, maintains reepithelialization, increases collagen synthesis, increases wound contraction and stimulates angiogenesis, to be effective in suppressing inflammation by inhibiting the release of histamine and leukotrienes from mast cells (12, 16-17).

Achillea millifolium

Achillea millifolium has been used in traditional medicine for thousands of years to treat wounds. *Achillea* plant is named after Achilles, who one of the important names of Greek mythology, who used the plant *Achillea spp* to treat soldiers injured in the Trojan war (18). It has been reported to be proven with histopathologically, immunohistochemically and biochemically in a study on laboratory animals that pomade obtained from the flowers of the *Achillea* plant accelerated epithelialization when applied on wounds, it formed a connective tissue rich in fibrocyte and collagen threads (19).

Hypericum perforatum

Hypericaceae (*Yellow St. John's Wort*), a subfamily of the *Clusiaceae* family, is known as the genus *Hypericum* and has nearly 400 species around the world. It was reported in a study on laboratory animals, that *Hypericum perforatum* was significantly effective for the application on incisional wounds (20). It has been reported that *St. John's Wort's* oily forms are used in the treatment of burn wounds, where it shortens the healing process, shows antibacterial effect, first-degree burns treated with *St. John's Wort ointment*

heal in a short time, second and third-degree burns to heal three times faster without the formation of keloid tissue compared to treatments with traditional methods (21). British botanist J. Gerard reported in his book that the flowers and seeds of *Hypericum Perforatum* are diuretic and reduce kidney stones when boiled and the water is drunk, the porridge prepared from the leaves is good when applied to fire and boiling water burns, all kinds of wounds and bruises, and when the leaves are boiled and drunk, it relieves ulcer pain (22).

Momordica charantia

Bitter melon is a type of tropical plant from the *Cucurbitaceae* family, called *Momordica charantia*, grown as an annual, growing like a thin and climbing ivy. *Momordica* means "bite" in Latin. Bitter melon is also known among in public by the names of bitter gourd, bitter melon, karela, balsam apple and balsam pear (23). It has been reported that potency bitter melon, which has many medicinal properties, antidiabetic, antibacterial, antifungal, antiviral, hypolipidemic, anticancer, antioxidant, analgesic, anti-inflammatory, antihypertensive, antiprothrombin, antiulcer, antidepressant effects as well as liver protective and obesity preventive effects. Ripe fruits of bitter melon are used in the treatment of wounds. It is reported that the bitter melon plant is used externally in the treatment of wounds, herpes and cut wound and in the treatment of peptic ulcers in our country. It has been reported that in studies examining the effectiveness of wound healing by applying the extracts obtained from bitter melon, the plant has a very effective role in wound healing due to its antibacterial activity, antioxidant, anti-inflammatory, analgesic and antiulcer properties (24-26).

Inula viscosa L.

Inula (*Compositae*) from the *Asteraceae* family is a large genus of the *Inuleae* family with over 100 species. The genus *Inula* is mostly found in Africa, Asia and Europe, predominantly in the Mediterranean region. *Inula helenium L.*, *Inula racemosa* and *Etulapritannica L.* are frequently used in traditional medicine. *Inula helenium* is known as *Inula viscosa* plant in Turkey and its roots, which are dried under suitable conditions, are known to be good for human health in many ways. *Inula* species have rich biological activity and this genus has antibacterial, antiproliferative, hepatoprotective, antioxidant, antidiabetic, antitumoral, anti-inflammatory etc. effects are reported. It is known that the leafy branches of the *Inula heterolepis* Boiss plant are used as an appetite stimulant and therapeutic against hemorrhoids, while the above-ground parts are used in respiratory tract ailments and stomach diseases. The plant, which is reported to have an adhesive and healing effect by putting the fresh leaves of *Inula viscosa* on wounds, is known as sticky andiz plant among the people (27-29).

Pinus nigra L.

Pinus nigra is from the *Pinaceae* family. It is known that the phenol derivatives in the tar and resins obtained from pine trees are used in wound healing because they have antiseptic, antimicrobial and antiparasitic effects. Tar and resins are used in veterinary medicine, especially in nail cracks, horn cuts and fractures, and in cases such as nail stinging during horseshoeing. It has also been reported that tar is used in the maturation of abscesses, in the treatment of external parasites and resins in skin treatments such as wounds and burns (30-32). Hippocrates used tar in

the treatment of wounds and reported that tar had antiseptic properties (33).

Arnebia densiflora

The *Arnebia* genus is a member of the *Boraginaceae* family. Members of this family consist of herbaceous plants and shrubs (34). *Arnebia densiflora* is popularly known in our country with the names of eyilik otu, kırmızı kök, eĝnik, enlik, havacıva. The root bark of *Arnebia densiflora* is used externally for wound healing and the treatment of burns (35). Root bark of *Arnebia densiflora* and wood of pine species are cut into small pieces and mixed, cooked in butter to obtain the consistency of pomade. It has been reported that this prepared pomade is applied externally on wounds and burns (36).

Olea europaea

Olive (Olea europaea) belongs to the olive family (*Oleaceae*). It is a tree species native to the Mediterranean climate zone, whose fruit is eaten. Olive oil is used for food and therapeutic purposes, as well as its leaves containing tannin, essential oils, organic acids and resin are used for therapeutic purposes (37). Olive is used purely in traditional folk medicine for wounds and burns, and it can be more effective in the treatment of wounds and burns by using it with many different plant and oil types. Among the people olive oil beautifies when applied to the skin, heals diaper rash when olive oil is burned in a coffee pot and cooled and then applied to the rash area with cotton. It has been reported that olive oil heals when applied to the inflamed area, and it is good for injuries when crushed with olive seeds and applied to the injured area (38). The mixture prepared by keeping the flowering parts of *St. John's Wort* in olive oil for a

month is used in the treatment of burns and burn scars (39).

Centaurium erythraea

Centaurium Erythraea plant is from the *Gentianaceae* family and there are 7 species in our country. It is also known by the names of "Red St. John's Wort, Red centaury, Little St. John's Wort, malaria grass" among the people. It is used in traditional folk medicine as an appetizer, digestive regulator, digestive, antipyretic, sedative (40). It is used as a traditional folk medicine in the Balkan countries in diabetes, hepatitis, gout, inflammatory diseases and high fever (41). It has been revealed that *Centaurium* plant species are also used in traditional folk medicine in the treatment of malaria, anorexia, eczema, hemorrhoids, goiter, stomach ulcer, stomach pain, back pain and intestinal diseases (42). In addition, in a study investigating the effect of *Centaurium Erythraea* on wound healing, it was observed that it increased connective tissue on wounds, accelerated collagen proliferation and epitheliogenesis (43).

Micromeria congesta

Micromeria genus is from *Labiatae (Lamiaceae)* family and there are 14 species and 22 taxa in Turkey. The *Micromeria* genus is from the *Labiatae (Lamiaceae)* family. There are 14 species and 22 taxa of this plant in Turkey. 12 of them are endemic. It is popularly known as "rock pennyroyal" (44-45). *Micromeria Congesta* grows spontaneously, especially in the mountainous regions of Şanlıurfa and Gaziantep. In traditional folk medicine, *Micromeria congesta* tea is used as an appetite stimulant, carminative, antibacterial, cough treatment and stimulant (40,46). It has been reported that mint flavored tea prepared with the leaves of *Micromeria fruticosa* in Israel is used in

cough, cold, indigestion and high blood pressure (47). In a study on *Micromeria congesta*, which is traditionally used for wound treatment in folk medicine, it was reported that *Micromeria congesta* may be effective in wound treatment (48).

Plantago major L.

Plantago major (*Plantago major ssp. major L.*) is a perennial herbaceous plant species belonging to the *Plantaginaceae* family. Indians called the *Plantago major* plant the "white man's footprint" because it is found all over Europe. *Plantago* species are among the important medicinal plants because they contain various chemical compounds. It has been reported that plant content contains phenolic compounds (caffeic acid derivatives), flavonoids, alkaloids, terpenoids and vitamin C (49). In a study on the *Plantago major* plant, it was determined that the aqueous extract of the plant may be effective in the treatment of insomnia and anxiety (50). In another study on *Plantago major* subsp *intermedia*, it was reported that the plant has potential antioxidant and anticholinesterase activity (51). In addition, it has been reported that the leaves of the *Plantago major* plant are heated in butter and applied externally on wounds for therapeutic purposes (52).

Nigella sativa L.

Nigella sativa is a member of the *Ranunculaceae* family. It is mostly grown in Afyon, Isparta, Burdur and Konya provinces in our country. The seeds of black cumin are used as a spice and in the treatment of many diseases in different ways in traditional folk medicine. Active chemical components in essential oils of black cumin are thymoquinone, dithymoquinone, thymohydroquinone and thymol (53-54). It is used in the treatment of many diseases such as cough, asthma, inflammatory diseases, fever, pain,

bronchitis, dizziness, liver and kidney diseases, nervous system diseases, diabetes, eczema, digestive system diseases, hypertension, cancer, eczema among the people (55). It has been reported that black cumin is used in cases such as strengthening the immune system, fatigue and insomnia, wound healing, intestinal disorders, constipation relief, hemorrhoids, fighting intestinal parasites and rheumatoid arthritis (56).

4. Conclusion

Wound healing is a biological process that includes many biochemical and physiological events. The healing process of wounds and burns can occur more quickly with some substances and stimulating the active mechanisms of the body. In the past and today, many herbal products such as black cumin, olive oil, nervous herb and red root have been used in the treatment of wounds and burns and are still used. Studies on the use of herbal products in phytotherapy are increasing day by day. Far eastern countries such as India and China do a lot of work on herbal treatment methods and introduce them to the world in the form of herbal medicine. Such studies are also needed in our country and we need to make good use of the rich plant diversity we have. In order for herbal products to be used in traditional complementary medicine applications, more provable scientific studies should be conducted and they should be produced as herbal medicines.

5. Conflict of interest

The authors declare that they have no conflict of interest.

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