Medicinal Plants of Iran: A Systematic Review of Their Wound Healing Properties

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ABSTRACT
Burn is an injury where the skin is destroyedby various factors such as heat, cold, electricity, etc.When skin injuryoccurs, pathogens can invade the body and burn wounds get infected shortly after the damage. The wound healing process is a process done by the coordination of tissues, cells and various factors. In the acute phase, inflammatory mechanism of burns has negative effects due to capillary leak. On the other hand, in the later stages of burn,inflammation is necessary for wound healing. Silver nitrate, silver sulfadiazine, and Mafenide acetate are also used for wound care. These compounds cause delayed wound healing and have cytotoxic effects. Iran is among the countries that have rich traditional medicine and herbal treatment of burn wounds in history. Therefore, in this review article, we tried to report the medicinal plants native to Iran which are effective for burn wounds. In this review article, by searching databases such as Scopus, Google Scholar, Spy DVD, mag Iran and… the articles were searched by searching keywords including burn wounds, herbs, extracts, essences and Iran. After finally searching, it was determined that medicinal plants below are the most important medicinal plants native to Iran that affect burn wounds. 11 Medicinal herbs 11 Abukhalsa plant, chamomile, oak, hungry for love, green tea, purslane, cinnamon, Hypericum, and Commiphora are the most important Medicinal Plants which are effective for burn wound healing in Iran. Alkanin, Naphthoquinone and Shikonin, tannins, pectin, alkaloids, saponins and tannins fixed, resin and vitamin C, flavonoids rutin, aucubin and catalpolCatechin, Epicatechin, EpicatechinGallate, Epigallocatechin and Epigallocatechin-gallate, oxalic acid, Cinnamic acid, caffeic acid , maleic acid, Citric acid, coumarin, flavonoids, alanine, tannins, alpha-linolenic acid, cinnamic acid, phenolic compounds such as eugenol, and safrolephellandrene, terpene compounds such as limonene and linalool, trans-cinnamaldehyde (MDA), tannins, coumarin, resin, Cinema-hydroxy phenyl propane compounds such as formaldehyde and mannitol, curcumin, terpenoids, steroids, Flavonoids, lignans are active compounds of plant bioactive substances that are effective on burn wound healing.

Keywords: medicinal plants, healing, burns, Iran.

INTRODUCTION

The skin is responsible for multiple tasks such as maintaining skin hydration, preventing the penetration of pathogenic agents into the body, and protecting the underlying structures. Therefore, any disruption in its integrity can be considered severe harm to the body. Still one of the main causes of death and disability in many countries are thermal injuries and burns. 1200000 people are burned annually in the United States that require treatment[1]. In addition to the physical and psychological consequences of severe burns due to needing multiple surgeries and the rehabilitation, it's widely considered to be the most costly of diseases[2]. Burn injuries are traumatic events that are associated with systemic and local effects[1]. Burns are injuries where the skin by various factors such as heat, cold, electricity, etc. is destroyed. When the skin is injured, pathogens can invade the body and burn wounds get infected shortly after the damage is done[3-5]. Burn wounds are divided into various types based on the cause. A variety of burn wounds including chemical, electrical, and radiation burns are divided. Another type of categories of burn wounds include first-degree burns which includes the involvement of epidermis. Second degree burns, which in addition to epidermis, also involves dermis and third-degree burns destroy all layers of the skin[1]. Burn wounds are good places for starting an infection. Thus, wound infection repeatedly occurred in these patients and is considered one of the most important causes of their deaths[4]. In the meantime, the wound healing is a process that occurs when the tissues, cells and various factors are coordinating with each other. In the acute phase of burn, inflammatory mechanism has negative effects due to capillary leakage. On the other hand burns in the later stages of inflammation is necessary for wound healing[6]. Silver nitrate, Mafenide acetate, and silver sulfadiazine

Row	Scientific Name	Family Name	Persian Name	Description
1	*Arnebiaeuchroma*	Boraginaceae	Abukhalsa	Abukhalsa 1% and 10% effect on wound healing mice second-degree burn[20]
2	*Matricariachamomilla*L	Asteraceae	Chamomile	Topical application of chamomile extract 20%,causes improvement in the second degree burns in two lab rats[14]
3	*Quercusbrantti*	Fagaceae	Oak	Results of a study in male Wistar rats indicated that the thickness of the epidermis and the dermis of the skin and reduction of burn rate in receiving groups of aqueous extract of oak had

				1, 4 and 7% and silver sulfadiazine compared with the control group increased significantly[21]
4	*Aloysia citrodora*	Verbenaceae	Quince	The results of an experimental study in BALB/ c mice showed that the percentage of burn wound healing in the 21st day in grain groups was 99.502, silver sulfadiazine group 92.26, the Vaseline group 97.69 and 92.97 for the control group[22]
5	*Scrophulariastriata*	Scrophulariacae	Scrophularia	Results of a study in Wistar rats showed that 2.5% dose of the Scrophularia plant has a significant effect in the treatment of burn wounds[23]
6	*Camellia sinensis*	Theaceae	Green Tea	Results of a study in male Wistar rats showed no healing time and burn for containing or lack of ointment extract and respectively were 0.62 ± 18 and 0.38 ± 20.33[24]
7	*PortulacaOleracea L*	Portulacaceae	Purslane	Results showed a 10% dose of Purslane extract accelerates the healing of burn wounds in BALB / c mice[25]
8	*Cinnamomumzeylanicum*	Lauraceae	Cinnamon	Cinnamon extract accelerates the burn wound healing in male Wistar rats[26]
9	*Hypericum perforatum*	Hypericaceae	Hypericum	Results of a study in male Wistar rats showed that Hypericum reduces the average surface burns, epidermal thickness and the malondialdehyde[27]
10	*Commiphoramyrrha*	Burseraceae	Commiphora	2.5 percent of the Commiphora plant extract had a well healing process on burn wound healing in rats[28]
11	*Myrtus communis*	Myrtaceae	Myrtle	Ethanol extract of Myrtle increase the number of blood vessels, and fibroblasts at the site of the burn on the skin of male mice rats[29]

are also used for wound care[2]. Silver sulfadiazine compounds are used as the main treatment for burns. These compounds cause delayed wound healing and are cytotoxic effects[7,8]. Thus, attempts to find natural ingredients that affect the burn is in progress. According to these, several studies in different fields such as biotechnology, pharmacognosy, medicinal chemistry and etc have paid special attention to medicinal plants to find new drugs effective in the treatment of burn wounds.

The use of plants, plant extracts and other herbal preparations to treat of various diseases[9-19], cuts, wounds and burns in many countries have a long history. In countries such as India and China, where traditional medicine has a long history and is powerful, there are valuable information on the many unknown plants and forests in the treatment of wounds. Iran is among the countries that have a rich history in traditional medicine and herbal treatment of burn wounds. Therefore, in this review article medicinal plants that are native to Iran which are effective in healing burn wounds are reported.

METHODS

In this review, articles were searched by searching the databases of Scopus, Google Scholar, Magiran, etc and searching keywords including burn wounds, herbs, extracts, essences and Iran.

RESULTS AND DISCUSSION

After searching finally found that 11 plant Abukhalsa herbs, chamomile, oak, hungry for love, green tea, purslane, cinnamon, Hypericum, Commiphora and wounds of the most effective herbs are native to Iran.

Additional information about the medicinal plants native to Iran of burn wounds can be seen in Table 1. Based on the results, Abukhalsa plants, chamomile, oak, hungry for love, green tea, purslane, cinnamon, Hypericum, Commiphora and wounds of the most effective herbs are native to Iran. In traditional medicine the Abukhalsa plant is an antiseptic and wound healing plant[30]. The root of the Abukhalsa plant contains Alkalin, Naphthoquinone, and Shikonin[31]. In traditional medicine, chamomile is used for pityriasis, eczema, acne and bronchial treatment quality for coughs and colds, and acts as a fever redactor[32]. The most important chemical in the Oak plant is Tannin[33]. In

traditional medicine Quince is used for hoarseness, laryngitis, inflammation of the bronchi and especially for washing burn wounds[34]. In the Quince grain there are amounts of Pectin, alkaloids, saponins and fixed tannins, resin and Vita min C, Flavonoids rutin[35]. Scrophularia is used for the treatment of gastrointestinal diseases, infectious diseases, pulmonary, wound cleaning and healing of fever[36]. Scrophularia contains compounds of aucubin and catalpol[37,38]. Green tea contains compounds such as Catechin, Epicatechin, EpicatechinGallate, Epigallocatechin and is Epigallocatechin-gallate[39]. Active ingredients Purslane contains oxalic acid, Kynamyk acid, caffeic acid, maleic acid, citric acid, coumarin, flavonoids, alanine, tannins, alpha-linolenic acid and is Glucosoids of menotropin[40]. Cinnamic acid, phenolic compounds such as eugenol, and safrolephellandrene, terpene compounds such as limonene and linalool, transcinnamaldehyde (MDA), tannins, coumarin, resins, compounds such as hydroxy phenyl propane Cinema (MDA) and mannitol are the most important ingredients of cinnamon extract[41]. The most important compound of the turmeric plant is curcumin[42]. Phytochemistry studies on the plant indicate the presence of terpenoids, steroids, Flavouids, and lignans[43]. Find effective drug combinations for the treatment of any disease is a scientific strategy for control, prevention and treatment of disorders[44-48]. It seems that the effective compounds in the named plants for burn wound healing are made up of effective bioactive substances.

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