

# The Effectiveness of Topical *Arnebia euchroma* Oil in the Treatment of Pressure Ulcer: A Case Report

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**Abstract:** Decreased tissue blood flow causes pressure ulcers due to prolonged pressure on the area, which becomes problematic for immobile individuals. The medical community has often been involved in curing such a problem in individuals with disabilities and immobility. To alleviate this problem, therefore, plenty of investigations are always seeking novel methods. Furthermore, herbal plants are increasingly used owing to the accepted status of plant-derived drugs in recent years. Our female case aged 52 years that was referred to the wound clinic complaining sensory and motor weakness of the upper extremity and sudden paralysis of the lower extremity as of 1 year ago, which was diagnosed as myelitis. She complained of two wounds on both sides of the right and left buttocks with a size of 9 × 5 and another 6 × 4.5 cm from 3 months ago, and a wound with a size of 5 × 4.5 in the sacral area (sacrum) from 20 days prior to the admission. There was tissue necrosis without muscle engagement, osteomyelitis, or tunneling; besides, nasty odors and sludge were absent accounted for in class 3 in the group of wounds. She received starting therapy using *Arnebia euchroma* oil. As of the 2nd week onward, she was treated very successfully, and the complete wound healing occurred in 8 weeks. The use of *A. euchroma* for wound healing and reducing infection and inflammation can greatly contribute to the cure of pressure ulcers and can be properly suggested in healing these ulcers.

**Keywords:** Pressure ulcer, wound healing, *Arnebia euchroma*, bed sore, traditional persian medicine

## Introduction

In a pressure ulcer, the skin or the underneath tissue is locally injured from unmitigated pressure on the soft tissue of the body,<sup>1</sup> or pressure along the cleft between a bony protuberance and an exterior surface for a prolonged period.<sup>2,3</sup> There is an increased number of patients with pressure ulcers in spite of the improvements in the quality of delivering healthcare on the globe such that pressure ulcers have become mainly problematic in acute and prolonged care centers.<sup>4,5</sup> This problem is reported to be prevalent in over 1.3 million adult people globally.<sup>6</sup> Sore results from tissue blood flow impairment and progressively necrotic areas of the body cells and necrotic cells that destroy their underneath layers.<sup>7</sup> Bedsores are mostly observed in sacrum and heels, with types 1 and 2 being the prevalent levels of austereness.<sup>8,9</sup> As defined by the National Pressure Ulcer Advisory Panel (NPUAP),<sup>10</sup> it is a persistently pressured area typically on a bony protuberance leading to ischemia, cell death, and necrotic tissue (Table 1).<sup>11</sup> As an index, the quality of patient care services is indicated by WHO using the occurrence and frequency of bedsores. It is highly important to use efficacious preventing actions and their therapies. The therapy is based on assessing sore austereness, reduction of pressure, friction, and shear stresses, wound care improvement, necrotic residue removal, bacterial infection management, and correction of nutrition-related shortages. Intervention approaches consist of special alterations in bedsores in combination with training approaches.

The 2019 CPG defines bed sore as “the locally injured skin and/or the underneath tissue, resulting from pressure or pressure combined with shear. While PUs/Pis typically happen over a bony protuberance, they can result from a medical apparatus or different objects.”<sup>12</sup> Bed sore may be represented

as healthy skin or as an open sore with possible pain. The tissue is damaged due to the intensely and/or lengthily exposed soft tissues to persistent mechanical loading, i.e., malformations in compression, tension, or shear or a combined condition of these loading styles. Persistent loading (defined as quasi-static loading as well, i.e., a nearly/almost static loading state) denotes loads exerted constantly for prolonged periods, including minutes to hours or even days. The soft tissues are differently tolerant to persistent malformations by the tissue type; microclimate, perfusion, age, health status (either chronic or acute), and systemic comorbidities and localized (topical) conditions of the soft tissues may also influence persistent malformations, and the persistent mechanical loading affects the mentioned factors.<sup>13</sup>

Bed sore therapy is strongly predicted by the use of humid coatings and supporting sufficiently through nutrition.<sup>14,15</sup> Currently, society and the medical workforce are interested in plant-derived drugs and remedies and conventionally conducted traditional medicine, which are justifiable cost-effectively in addition to their lengthy history, safe use, accessibility, and ease of utilization.<sup>16,17</sup> Additionally, traditional herbal species are today commonly used for sore remedies, and more than 80% of the global population is reliant on traditional medicine for various skin ailments.<sup>18,19</sup> Herbal plants are the main resource of natural products with different actions regarding their structures, biologic activities, and modes of action.<sup>20-22</sup> Plant materials contain various constituents, in particular polyphenols, flavonoids, phenolic acids, and the like, which play a role in suppressing free radicals and in the anti-oxidant activities of herbal plants.<sup>17,23</sup>

*Arnebia euchroma* (Royle) I.M. Johnst is a traditional herbal species that is reputable in the traditional medicine of Iran,<sup>24</sup> termed a red plant or *Heveh choaeh*. *Arnebia* belongs to

Table 1. Degrees of bedsore defined by NPUAP<sup>14,40</sup>

Degree 1	Erythema without pressure whitening	Intact skin with redness with no pressure whitening (non-blanchable) in a localized area, typically on a bony protuberance. The area can possibly have pain and may be hard, soft, and warmer, or colder than adjacent tissues.
Degree 2	Relative thickness	Losing partially the thickness of the dermis appearing as a surface lesion with a red, pink, scaly bed. It appears as a blushing or dry surface lesion with no scaling or bruising. This categorization is not useable in describing skin tears, band burns, dermatitis accompanied by incontinence, maceration, or excoriation.
Degree 3	Losing all skin thickness	Fat may be present beneath the skin, but not under the bone, tendon, or muscle. Scaling may be present but the depth of the tissue loss is unknown. This lesion can comprise atrophy and perforation.
Degree 4	Losing all tissue thickness	Losing complete thickness of tissue by appearing bone, tendon, or muscle. It is typically accompanied by degeneration and perforation. Grade 4 sores can extend to muscle or supportive structures (the fascia, tendon, or joint capsule) possibly leading to osteomyelitis or osteitis.

the Boraginaceae family and contains a variety of species growing in Asian and North African regions. It appears as an herb-like plant covered with pointy silver hairs. *H. choaeh* is a dark red and unscented herbal species growing in south-eastern Iran. The herb's root is the useable part. The roots of herbal plants, such as *Echium*, *Lithospermum*, *Onosma*, *Alkanna*, and *Arnebia* are replete in naphthoquinone, Shikonin, alkanin, and Isohexenyl-naphthazarin derivatives with various remedial activities, including anti-inflammatory, antimicrobial, and anticancer properties.<sup>25-27</sup>

The reliable books of Iranian medicine, e.g. *Makhzan Al-Adavieh* and *Qarabadin*, introduce "*H. choaeh*" as one of the main remedies to heal wounds. It is also utilized in the formulation of some topical wound-remedial drugs that assist the skin recovery and regenerate the tissue, cure skin inflammation, and old refractory lesions.<sup>28-32</sup>

In recent years, the activities of this herbal species have been investigated in plenty of research. *H. choaeh* has shown anti-inflammatory impacts on the remedy of surgical wounds, burns, and bedsores.<sup>33-36</sup> In addition to its wound remedy activity, this herbal species has been demonstrated to possess anti-inflammatory, antibacterial, anti-tumor, anti-diabetic, anti-viral, antioxidant, and anti-thrombotic activities.<sup>37-39</sup>

## Case Report

Our case was a female aged 52 years who complained of sensory and motor weakness of the upper extremity and abrupt palsy of the lower extremity since a year ago; she was diagnosed with myelitis and complained of three lesions, two of which were on both sides of the right and left buttocks involving the muscle with no osteomyelitis, tunneling, nasty smell, and slush since 3 months prior to the admission. For a month prior to referral, she was under antibiotic therapy, progressive bandages, and ozone therapy for these two wounds in the hospital. Despite the debridement and cleaning of the lesions, indications of curing were absent. These two lesions were measured at 9 by 5 and another one 6 by 4.5 cm, which accounted for grade 3 in the class of lesions. Besides, 20 days prior to the visit, a newly emerged lesion measuring 5 by 4.5 occurred in the sacral region, with tissue necrosis with no muscle engagement, osteomyelitis, or tunneling, having nasty odors and slush, which accounted for grade 3 in the class of lesions. The wound was not debrided in this case (Figure 1). All the lesions were scored 13 by PUSH criteria scoring. Although the surgery was necessary, it was not possible to operate the patient due to her overall



Fig. 1 Sacral ulcer at the start of treatment.

situation; thus, she was introduced to our wound clinic (Orchid) for topical therapies. *A. euchroma* oil was the starting remedy for her. She underwent an oil-containing bandage two times daily that covered the lesion surface by 3 mm each time. Enhancements in serous secretion, granulation tissue, odor, and lesion size shrinking were initially monitored every day and then every week. Serous was discharged slightly in the whole lesions on the 1st day. Within the 1st week, the discharge rose in the lesions but with no nasty odor. Following 10 days of beginning the therapy, the nature of the tissue changed in the pressure ulcers with a pinkish color change and generating healthy granulation tissue, which caused the wound contraction. By the 3rd week, the length and width of the lesions did not change significantly, however, the 10th day of the therapy onward was associated with the filled cavity depth and reduced lesion depth, appearing nearly healed. The sacral lesion was photographed after 6 weeks of therapy, indicating the considerable and acceptable remedy of the lesions (Figure 2), which were scored 11, 9, and 9 in PUSH scoring. Similarly, the lesions



Fig. 2 Sacral ulcer at week seven of the treatment.

healed completely (disappearance of the secretions, filling of the cavity, and fully closed lesions) after the 8th week.

### Preparation of *H. choaeh* drug

Qarabadin is a worthwhile pharmacological book of traditional medicine in Iran, which was employed to prepare *H. choaeh* oil.<sup>41</sup> The preparation process was started with heating olive oil (to the degree without burning the oil with no rising odor of burns by preventing fumes). This was followed by adding the ground root of *H. choaeh* in a volume of a quarter of its weight and then boiling for dyeing the oil. Next, some wax was added for oil filtration and concentration.

### Discussion

This case demonstrated that *H. choaeh* can be used with high contribution to healing bedsores. The *H. choaeh* root utilized here contains a variety of compounds such as alkanin and chiconin.<sup>3</sup> As mentioned by the specialists of traditional medicine, *H. choaeh* has a hot and dry nature, and its roots possess various activities including the application in wound-drying liniments and for treating some skin ailments. The anti-inflammatory impact of *H. choaeh* roots was assigned to its two natural products, alkannin and shikonin, by Kourounakis et al. (2002). As claimed by Sidhu et al., the therapy with *H. choaeh* is beneficial as it significantly reduces the ulcer surface area, increases cell multiplication, and amplifies collagen biosynthesis. Additionally, Senel and Papageorgious proposed the antioxidant property and the function of oxygen free radicals, alkaline, and chiconin as novel alternates for wound remedy via anti-inflammatory, antimicrobial, and antioxidant activities.<sup>35-38</sup> Assimopoulou et al. ascribed the anti-inflammatory impacts of *H. choaeh* roots to hydroxynaphthoquinones being present in its root extracts. Ahmadian et al. also report that chiconin (beta alkanin) is a naphthoquinone pigment obtained from plant roots with antimicrobial effects.<sup>42,43</sup> Damiaunakos et al. presented evidence of potent chiconin and alkaline drugs

having substantial biologic functions, such as wound remedy and antimicrobial, anti-inflammatory, antioxidant, anti-cancer, and anti-thrombotic effects.<sup>44</sup> Akkol et al. documented that therapy by *H. choaeh* lowered the lesion area and enhanced cell multiplication, migration, vascular formation, and re-epithelialization of lesions.<sup>45</sup> In a study on the properties of *A. euchroma* and *Malva sylvestris*, Pirbalouti et al. found that *H. choaeh* significantly influenced wound remedy acceleration.<sup>46</sup> The same authors examined the influence of *H. choaeh* root extract on diabetic sores in rats. They reported that the sore level showed a significant reduction in the test animals with a shorter epithelial time than the control rats as the sore was contracted more swiftly.<sup>47</sup> Nasiri et al. assessed the impact of *H. choaeh* on burns and observed a 10% better mean wound remedy in the *H. choaeh* group than silver sulfadiazine after 10 days of burns. The *H. choaeh* group also showed a greater percentage of shrinking wounds.<sup>32</sup> In their research on rats, Ashkani et al. found that the extract of *H. choaeh* more significantly affected epithelialization, fibroblast proliferation, and collagen synthesis, as well as more anti-inflammatory impacts than the control group.<sup>48</sup> Sedaghat et al. investigated the impact of *H. choaeh* on the remedy of sores in rats. They observed the anti-inflammatory impacts of *A. euchroma* that helped wound remedy by mitigating the degree and acuteness of inflammation.<sup>36</sup>

The literature indicates the anti-inflammatory and wound remedy impacts of *H. choaeh*. According to the present case study, the use of this herb alongside appropriate nursing care resulted in significantly improved wound healing.

Plant sources are worthwhile for investigations on developing novel medicines. Accordingly, the renewing impact of *H. choaeh* was examined in this research, indicating that the oil prepared from this herb possesses antibacterial, anti-inflammatory, and immunomodulatory properties involved in decontamination. It helps in the creation of an intact granulation tissue for wounds, and its antioxidant properties eliminate free radicals from the environment, preventing their creation. Such activities of the drug control the wound remedy procedure and the view of remedial signs. The *H. choaeh* oil has a mediatory role between the sore surface and the coverage substance to attach them together that hinders drying the wound and improves the appropriate remedy of wounds by the acceleration of epithelialization and collagen synthesis. Regarding this, it seems that the major mode of action of anti-inflammatory impacts of this herbal species is the antioxidant impact of alkaloids present in its roots. To confirm this, it is recommended to implement a clinical trial with this drug.

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This research was carried out as a case when the disease was observed with this high bed sore that fortuitously led to a good consequence for the patient. Herewith, the authors express their appreciation to the esteemed patient and her family.

### Conflict of Interest

None. ■

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