

Phytotherapeutic Innovation in Regenerative Medicine: Development of a Bioactive Herbal Ointment for Burn Healing Using Algerian Sahara Plants

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Abstract

This study aims to evaluate local ethnopharmacological knowledge and to formulate and assess the efficacy of a plant-based ointment for the treatment of burns, based on medicinal plants traditionally used in the El Oued region (Algeria). This work responds to the growing need for natural, effective, and safe therapeutic alternatives for burns, derived from a rich traditional heritage of healing plants.

The ethnobotanical survey revealed the use of 32 plant species belonging to 25 botanical families, with a marked dominance of the Lamiaceae and Asteraceae families due to their richness in anti-inflammatory and wound-healing compounds. Five key medicinal plants were identified based on their high Use Value (UV) and high Frequency of Citation (DF) by the local community: *Artemisia campestris*, *Teucrium polium*, *Urtica dioica*, *Aloe barbadensis*, and *Pistacia lentiscus*, reflecting strong confidence in their therapeutic potential. Laboratory analyses demonstrated variation in aqueous extraction yields, with *Artemisia campestris* showing the highest yield (19.22%), followed by *Urtica dioica* (14.18%) and *Teucrium polium* (8.4%). An experimental ointment was formulated using extracts from the five selected plants and evaluated for its physicochemical properties. The formulation exhibited a homogeneous texture and an appropriate pH (5), although microscopic aggregates were observed due to the late addition of *Aloe barbadensis* gel after cooling.

In addition, biochemical, macroscopic, and microscopic tests were conducted on rats to assess the ointment's topical effect on skin. The results showed a marked improvement in skin tissue among treated rats compared to the control group, with reduced inflammatory markers and improved cellular organization, indicating the ointment's therapeutic efficacy in accelerating skin regeneration. Hematological analyses revealed systemic disturbances associated with burn injury, such as elevated white blood cell counts as evidence of an acute inflammatory response. The tested topical formulations (especially the locally prepared ointment) showed significant potential in modulating these parameters. Signs of anemia were also observed (red blood cell count = $8 \times 10^{12}/L$, hematocrit = 37%, hemoglobin = 12.5 g/dL), with partial improvement noted post-treatment. The presence of reactive thrombocytosis further confirmed the hematological impact of burn injuries.

In conclusion, this study highlights the therapeutic potential of a locally formulated plant-based ointment for burn treatment. The findings support the development of effective, natural, and safe therapeutic alternatives grounded in traditional knowledge.

Keywords: Ethnopharmacological study, Burns, Plant extracts, El Oued, Medicinal plants