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Commentary

The Role of Aloesin, Aloin, and Emodin in the Treatment of Skin Disease

George Segal*

Department of Medicine, University of Laval, Quebec City, Canada

DESCRIPTION

The ability of *Aloe vera* and active compounds to heal wounds is the subject of the majority of *in vitro* skin protection studies. Immortalized human keratinocyte HaCaT, primary normal human epidermal keratinocytes HEKa, and fibroblasts are the most often working cell lines. According to research, *Aloe vera* and its main components (aloesin, aloin, and emodin) largely defend the body through antioxidant and anti-inflammatory mechanisms. As a consequence, *Aloe vera* increased keratinocyte proliferation and differentiation in fibroblasts by enhancing lysosomal membrane integrity and upregulating TFG1, bFGF, and Vegf-A expression.

Furthermore, in a cellular model of primary cultures of corneal epithelial cells, *Aloe vera* solution may accelerate corneal wound healing by boosting type IV collagen-degrading activity at low doses (175 g/mL). Aloin also protected the skin by reducing IL-8 production, DNA damage, lipid peroxidation, and ROS generation while increasing GSH content and SOD activity. Aloesin aided wound healing by increasing cell migration through the phosphorylation of Cdc42 and Rak1, as well as cytokines and growth factors. Aside from its therapeutic properties, Aloe polysaccharide (20, 40, and 80 g/mL for 24 h) has been proven to be a beneficial agent in psoriasis, as evidenced by a decrease in TNF- levels as well as IL-8 and IL-12 protein synthesis in the human keratinocyte HaCaT cell line.

The most common are *in vivo* study utilizing genetically altered animals (BALB/c mice, HR-1 hairless mice, and SKH-1 hairless mice) and UV and X-ray skin damage in animals. *Aloe vera* extracts and gel have been employed in the majority of these *in vivo* studies. In animal models with dermal wounds, topical *Aloe vera* promoted wound healing by reducing inflammatory cell infiltration, increasing lymphocytes with a $CD4^+/CD8^+$ ratio, and improving epidermal thickness and collagen deposition.

Another study using different medicinal plants was conducted in Indonesia to investigate the efficiency of Nigella sativa oil gel and Aloe vera gel on diabetic ulcers. Aloe vera was shown to be more successful in improving wound healing in alloxan-induced diabetes in Wistar rats with dorsum wounds, as evidenced by the decrease in necrotic tissue and inflammation and an increase in re-epithelialization.

Furthermore, in a UV-induced mouse model, *Aloe vera* gel powder enhanced epidermal growth factor and hyaluronan synthase expression while decreasing matrix metalloproteinases expression (types 2, 9, and 13). UV protection is provided by aloe sterols. Similarly, *Aloe vera* has been shown to defend against X-rays *via* antioxidant pathways (increased antioxidant enzyme activity and GSH content and reduced ROS production and lipid peroxidation). Among isolated chemicals, studies using aloe-emodin and aloesin have revealed that their therapeutic activity is linked to angiogenic characteristics.

Several clinical studies have also been conducted in the previous six years. Some of them have been designed to assess the efficacy of *Aloe vera* on ulcers. As a result, using *Aloe vera* gel twice daily for three months enhanced and expedited wound healing while also decreasing hospitalization duration. Furthermore, a study proved that *Aloe vera* gel applied twice a day daily for 10 days can reduce the formation of pressure ulcers on the hip, sacrum, and heel in a randomized, triple-blind clinical study with 80 patients hospitalized in the orthopaedic department.

CONCLUSION

Furthermore, clinical experiments have shown that *Aloe vera* increased tissue epithelialization and granulation in burns, enhanced caesarean wound healing, and accelerated wound healing of split-thickness skin transplant donor sites. Furthermore, the advantages of *Aloe vera* for maintaining good skin have been studied in randomized, double-blind, placebo-controlled research. As a result, taking 40 g of Aloe sterol (cycloartenol and lophenol) daily for at least 12 weeks improved skin elasticity in men under 46 years old who are exposed to sunlight but do not use sunscreen to protect themselves, reduced facial wrinkles in Japanese women over 40 years old by stimulating hyaluronic acid and collagen production, and increased gross, net, and biological elasticity in women aged 30-59. Despite clinical data on Aloe vera's skin-protective role, clinical trials have yet to find this medicinal plant useful, notably in minimizing radiation-induced skin harm.

Correspondence to: George Segal, Department of Medicine, University of Laval, Quebec City, Canada, E-mail: Gsegal@lav.ca

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