

## Aloe vera - a wound healer

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### ABSTRACT

Wound healing is a dynamic process. The use of aloe vera in wound healing is being considered in many studies. The aim of this comprehensive review is to present an update about the mechanism of action of aloe vera in wound healing. Aloe vera contains important ingredients necessary for wound healing, such as vitamin C and E, amino acids and zinc. Aloe vera affects various factors involved in wound healing and promotes healing.

**Keywords:** Aloe vera, wound healing.

### INTRODUCTION

Aloe vera is popularly known as *Aloe barbadensis* by taxonomists. It is being used since 1750 BC by Mesopotamians and Egyptians.<sup>1</sup> The Arabic word alloeh means shining and bitter.<sup>2</sup> Cleopatra attributed her beauty to the use of aloe gel. Further, historians have recorded that Alexander was persuaded by Aristotle to conquer the island of Socotra in east Africa, to obtain aloe which was known by Greeks as a wound healing agent for his soldiers.

Wound healing is a dynamic process, occurring in 3 phases. The first phase is inflammation, hyperaemia and leucocyte infiltration. The second phase consists of removal of dead tissue. The third phase of proliferation consisting of epithelial regeneration and formation of fibrous tissue. These repair products are derived from:

- a. Undamaged surrounding epidermis
- b. Underlying dermis.

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The ground substance is laid down in the early stages, which consists of glycosaminoglycans and proteoglycans. The laying of ground substance is initiated by the ingrowth of epithelial tissues from wound edges. It is followed by formation of granulation tissue and synthesis of collagen and elastin.<sup>3</sup>

#### Role of Aloe Vera in Wound Healing

The use of aloe vera in wound healing is being considered in many studies. The medicinal use of this plant is centuries old. It contains anthraquinones, saccharides, vitamin E and C, Zinc, enzymes, acetyl salicyclic and others. Acemannan is the major carbohydrate fraction obtained from aloe vera leaf. This fraction promotes wound healing, has antiviral, anticancer and immune stimulation effect.<sup>4</sup>

#### Chemical composition of aloe vera and properties<sup>4</sup>

Constituents	Number & Identification	Properties & Activity
Amino acids	Provides 20 of the 22 required amino acids and 7 of the 8 essential ones.	Basic building blocks of proteins in the production and muscle tissues.
Anthraquinones	Provides aloe emodin, aloetoxic acid, aloin, anthracine.	Analgesic, antibacterial
Enzymes	Anthranol, barbaloin, chrysophanic acid, smodin, ethereal oil, ester of cinnamonic acid, isobarbaloin, resistanol.	Antifungal & antiviral activity but toxic at high concentrations.
Hormones	Auxins and gibberellins	Wound healing & anti-inflammatory.
Minerals	Calcium, chromium, copper, iron, magnesium, manganese, potassium, sodium, zinc.	Essential for good health.
Salicyclic acid	Aspirin like compounds	Analgesic
Saponins	Glycosides	Cleansing & antiseptic
Steroids	Cholesterol, campesterol, lupeol, sitosterol	Anti-inflammatory agents. Lupenol has antiseptic and analgesic properties.
Sugars	Monosaccharides: Glucose & Fructose Polysaccharides: glucomannans / polymannose	Antiviral, immune modulating activity of acemannan
Vitamins	A,C,E,B, choline, B <sub>12</sub> , folic acid	Antioxidant(A,C,E) Neutralises free radicals

Aloe vera affects various factors involved in wound healing and promotes healing.

### Effect on epithelisation

Epithelisation is a major factor in wound healing, hydration, oxygenation and removal of dead tissue ensures good epithelisation. Aloe vera has high water content (96%). This prevents wound desiccation and increases migration of epithelial cells.<sup>5</sup> The microcirculation of wound is enhanced by aloe, increasing oxygenation. The catecholamines have wound retardant effect. Aloe blocks action of catecholamines, thus increases epithelisation.<sup>6</sup> Histological study has shown that aloe vera increases vascularity of the wound, which removes the dead tissue and makes wound healthy.<sup>7</sup> All these actions increase migration of epithelial cells from surrounding skin. Epithelisation acts as stimulus for laying of ground substance.

### Effect on collagenisation

Collagenisation determines the early closure, tensile strength and outcome of the scar. Aloe vera increases cross linking of collagen<sup>8</sup>. The Type I/ Type III collagen ratio of aloe treated wounds is low, indicating increased Type III collagen.

The levels of hyaluronic acid and dermatan sulphate, the main constituents of ground substance are high in aloe treated wounds. Aloe may also increase collagenisation by stimulating macrophage cytokine production. Acemannan acts as a macrophage stimulator.<sup>4</sup> Aloe vera may also block some wound healing inhibitors like sterols and aminoacids through the growth factors present in it.<sup>7</sup> The Ascorbic acid in aloe vera enhances the synthesis of collagen and counter balances collagen breakdown.<sup>9</sup>

Studies on diabetic rats have shown that aloe promotes wound healing by affecting the process of inflammation, fibroplasias, collagen synthesis, maturation and wound contraction. It also enhances wound tensile strength. Further studies have shown

that aloe vera is used for treatment of herpes simplex infection, lichen planus, gingivitis.<sup>10,11,12</sup> Reports of successful changes in root sensitivity containing aloe toothpastes have been confirmed.<sup>13</sup>

In conclusion, aloe vera on its own and through its constituents promotes wound healing. It being a natural substance, has less side effects. Clinical recommendations warrant further research.

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