

Aloe Vera: a miracle plant with its wide-ranging applications

Abstract

Aloe vera has been considered a miracle plant due to its potential of remedying many of human's ailments. It has been used for over five thousand years and still known today. In last two decades, a series of scientific research highlight the mysteries of this plant in detail. The *Aloe vera* plant, its active compounds, mode of action and extensive uses are briefly reviewed in this article.

Keywords: aloin, anthraquinone, anti-inflammatory, analgesic

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Introduction

Aloe vera, a plant of Liliaceae family, is not less than a blessing from centuries to date. The botanical name of *Aloe vera* is *Aloe barbadensis miller*. The name *Aloe vera* has derived from the Arabic word "Alloeh" means "shining bitter substance," and a Latin word "vera" means "true". About 2000 years ago, the Greek scientists regarded *Aloe vera* as the universal panacea. The Egyptians named *Aloe vera* "the plant of immortality". This plant is native to hot and arid regions and widely grown as an ornamental plant. The leaves of the plant contain mucilage tissue or aloe gel that is used for cosmetics and to cure mankind's ailments. *Aloe vera* is the marvelous herbal remedy with defined scientific effectiveness.^{1,2} Due to its amazing attributes, the plant has the ability to reverse ailments and soothe human life in myriad ways.

Active compounds with their properties

Total 75 potentially active constituents have been reported in *Aloe vera* include essential amino acids, vitamins, enzymes, Anthraquinone, minerals, lignins, sugars, salicylic acid, folic acid, sterols and saponins.^{2,3} *Aloe vera* provides 20 of the 22 human required amino acids and 7 of the 8 essential amino acids. It is a good source of vitamins A (beta carotene), C, E, B₁, B₂, B₃, B₆, B₁₂, folic acid and choline. Vitamins act as antioxidants which neutralize free radicals.⁴⁻⁶ It also contains a variety of minerals such as calcium, magnesium, manganese, chromium, copper, selenium, potassium, sodium and zinc. They are essential for the appropriate functioning of enzymes in different metabolic pathways. Aloe gel contains 8 enzymes: aliase, amylase, alkaline phosphatase, Bradykinase, carboxypeptidase, cellulose, catalase, lipase, and peroxidase. Bradykinase helps to soothe inflammation while others help in the breakdown of fats and sugars.¹⁻³

The sugars present in the mucilage layer of the plant are known as mucopolysaccharides. These sugars are monosaccharide's (glucose and fructose) and polysaccharide (glucomannans/polymannose). *Aloe vera* provides 12 Anthraquinone which belong to a group of phenolic

compounds known as laxatives. Aloin and emodin perform analgesic, antibacterial and antiviral activities. Fatty acids found in the plant are cholesterol, campesterol, lupeol and sisosterol. These fatty acids are plant steroids conferring the anti-inflammatory, antiseptic and analgesic properties. It also provides two core hormones; auxins and gibberellins that aid in wound healing due to anti-inflammatory action. Salicylic acid possesses anti-inflammatory and antibacterial properties. Lignin is an inert substance which enhances the penetrative effect of other ingredients into the skin. Saponins formulate about 3% of the aloe gel. These soapy substances have antiseptic and cleansing properties.¹⁻⁸

Mode of action

The healing property of *Aloe vera* is associated with a compound called glucomannans, which is enriched with polysaccharides (such as mannose). It mends fibroblast growth factor and encourages the activity and proliferation of these cells result in more collagen and elastic fibers production. It also improves transversal connections among these bands making the skin more elastic and less wrinkled.^{8,9} Mucopolysaccharides help in binding moisture into the skin and have anti-aging effect. Anthraquinone s present in latex are effective laxatives that help to increase intestinal water content, stimulates mucus secretion and improves intestinal peristalsis. Antimicrobial and antitumor activities of *Aloe vera* may be due to direct or indirect effects. Direct effects are due to Anthraquinone which inactivate various enveloped viruses such as herpes simplex, influenza and varicella zoster. Indirect effect involves stimulation of the immune system. The antiseptic agents such as lupeol, salicylic acid, cinnamonic acid, phenols and sulfur have an inhibitory action on bacteria, viruses and fungi. Several low molecular weight compounds present in aloe mucilage inhibit the production of reactive oxygen free radicals from activated human neutrophils.²

Wide ranging applications of Aloe vera

Based on the scientific evidences, *Aloe vera* has been widely used as therapeutic and medicinal agent due to anti-inflammatory,

analgesic, antimicrobial, anti-diabetic, antioxidant, anti-proflirative, anti-tumor, hypato protective, neuroprotective, immuno-regulative, anti-mutagenic, wound healing, anti-aging and radio protective properties (Table 1).¹⁻¹⁰

Table 1 Uses of *Aloe vera* and its products

Applications	Properties	Roles
Therapeutic	Wound healing	Help to sooth acute wounds (such as lacerations, surgical incisions and burns) and chronic wounds (such as infected wounds, arterial and venous ulcers)
	Anti-Inflammatory	In the treatment of arthritis, wounds and inflammatory bowel disease.
	Regulation of immune system	Inhibits calcium influx into mast cells, retards the release of ROS in activated human neutrophils. Shows substantial improvement in AIDS symptoms
	Antitumor	Prevents the formation of potentially cancer promoting benzopyrene-DNA adducts
	Laxative Effects	Cures Constipation, diarrhea, indigestion and irritable bowel syndrome by stimulating mucus secretion, regulating intestinal water content and improves intestinal peristalsis
Medicinal	Moisturizing, anti-aging and cosmetics	In skin care, protection and beauty products
	Antimicrobial and Antiseptic	Decreases the risk of many human ailments due to the inhibitory action on bacteria viruses and fungi
	Anti-diabetic	Increases the insulin level and shows hypoglycemic properties
	Anticancer	Heals the damage caused by radio and chemotherapy
	Stress	Reduces cell-damaging process and minimizes biochemical and physio-logical changes during stress condition in the body

Conclusion

The wonder herb, *Aloe vera*, has also made a better understanding of its use as cosmetics products and as a potential drug for the treatment of many ailments in addition to contemporary drugs. Though there are indications for its use, controlled trials are required to evaluate the drug-herb interactions and to govern its real efficacy.

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Conflict of interest

Author declares that there is no conflict of interest.

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