



## *Aloe vera*: A valuable multifunctional cosmetic ingredient

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**Abstract:** The *Aloe vera* plant (botanical name- *Aloe barbadensis* Mill.) has been known and used for centuries for its health, beauty, medicinal and skin care properties. It belongs to Asphodelaceae (Liliaceae) family, and is a shrubby or arborescent, perennial, xerophytic, succulent, pea- green color plant. The use of *Aloe vera* has increased tremendously in the field of cosmetology and a wide variety of products contain *Aloe vera* in one form or other for delivering a specific activity. *Aloe vera* contains 75 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids, which are responsible for the multifunctional activity of Aloe. Various cosmetic uses of aloe are reviewed in this article.

**Keywords:** *Aloe vera*; Activity; Cosmetology; Skin care; Uses.

### Introduction

Over the centuries, there have been many references to *Aloe vera*, in many different cultures, from the Ancient Greeks and Romans to Babylonian, Indian and Chinese people. The name *Aloe vera*, or true Aloe, is probably derived from the Arabic word 'ALLOEH', Syrian 'ALWAI' or Hebrew 'HALAL' meaning a 'shining bitter substance'. Hence the old laxative remedies 'bitter Aloes' is still listed in the US Pharmacopoeia today (Ather-ton 1997)

The Aloe plant is grown in warm tropical areas and cannot survive freezing temperatures. Internationally, Aloe can be found in Mexico, the Pacific Rim countries, India, South America, Central America, the Caribbean, Australia and Africa (<http://www.nupro.net/aloe/aloebook.pdf>).

*Aloe vera* is a succulent belonging to the lily family Liliaceae. In this family there are about 3,700 species of flowering plants, including garlic, onion and asparagus of which the former is also accredited medicinal properties. *Aloe vera* itself forms part of a subspecies (the Aloinae), of which there are at least 200 to 300 types. Of the true Aloes there are probably only four or

five with documented medicinal benefits. These are:

1. *Aloe barbadensis* Mill. sometimes called *Aloe linne* or *Aloe vulgaris* or the Curacao Aloe.
2. *Aloe perryi* Baker, the Socotrine Aloe or Zanzibar Aloe.
3. *Aloe ferox* often called Cape Aloe
4. *Aloe arborescens* and *Aloe saponaria* which are mainly used in Japan.

Among all the species around the world, only two species are most popular due to their high medicinal properties and are grown commercially-*Aloe barbadensis* Miller and *Aloe aborescens* (<http://www.nupro.net/aloe/aloebook.pdf>)

*Aloe barbadensis* – Common name- Aloe vera, Aloe indica, Curacao Aloe, Barbados Aloe, Lily of the desert, Indian Aloe.

Parts Used- Leaves, fresh leaf gel and juice, latex, dried juice of leaves and pulp (Park and Lee 2006; Kokate et al. 2003)

*Aloe vera* is a stem less or very short-stemmed plant growing to 80-100 cm tall, spreading by offsets and root sprouts (Figure

1). The leaves are lanceolate, thick and fleshy, green to grey-green, with a serrated margin. The flowers are produced on a spike up to 90 cm tall, each flower pendulous, with a yellow tubular corolla 2-3 cm long. The tissue in the center of the aloe leaf contains a gel which yields aloe gel or *Aloe vera* gel (Sampath Kumar et al. 2010).

Indian aloes contain aloinosides as major constituents with traces of aloin. (Indian Herbal Pharmacopoeia 1998). The major constituent of *Aloe vera* is 99-99.5 % water, with an average pH of 4.5. The remaining solid material i.e. 1-0.5% contains over 75 different ingredients including vitamins, minerals, enzymes, sugars, anthraquinones or phenolic compounds, chromones, flavanoids, lignin, saponins, sterols, amino acids and salicylic acid. These are described in more detail in table 1 (Atherton 1997; Dagnea et al. 2000). Table 1 lists the constitu-

ents in alphabetical order with their properties and inferred activities.



**Figure 1:** *Aloe vera* farm.

**Table 1:** Constituents of *A. vera* and its uses (<http://www.aloevera.co.uk/aloeprop.htm>)

Constituents	Properties & Activity
<u>Amino Acids:</u> Essential amino acids: Isoleucine, Leucine, Lysine, Methionine, Mhenylalanine, Threonine, Valine and Tryptophan.	Provides the basic building blocks of proteins in the production of muscle tissue etc.
<u>Non-essential amino acids:</u> Alanine, Arginine, Asparagine, Cysteine, Glutamic acid, Glycine, Histidine, Proline, Serine, Tyrosine, Glutamine, and Aspartic acid.	
<u>Anthraquinones:</u> Aloe emodin, Aloetic Acid, Aloin, Anthracine, Antranol, Barbaloin, Chrysophanic Acid, Emodin, Ethereal Oil, Ester of Cinnamonic Acid, Isobarbaloin, Resistannol.	In relatively small concentrations together with the Gel fraction they provide Analgesic, Antibacterial, Anti-fungal & Antiviral activity.
<u>Enzymes:</u> Aliiase, Alkaline Phosphatase, Amylase, Carboxypeptidase, Catalase, Cellulase, Lipase, Peroxidase	Helps breakdown of food sugars and fats aiding digestion & enhancing nutrient absorption
<u>Hormones:</u> Auxins & Gibberellins	Wound Healing & Anti-inflammatory
<u>Lignin:</u> Cellulose based substance	Thought to provide penetrating power in <i>Aloe vera</i> skin preparations and may act as a carrier for other components
<u>Minerals:</u> Calcium, Chromium, Copper, Iron, Magnesium, Manganese, Potassium, Sodium, Zinc	Essential for good health and is known to work in certain combination with each other, vitamins and other trace elements
<u>Salicylic Acid:</u> Aspirin like compound	Analgesic
<u>Saponins:</u> Glycosides	Soapy substance both cleansing and antiseptic
<u>Sterols:</u> Cholesterol, Campesterol, Lupeol, $\beta$ Sitosterol	Anti-inflammatory agents. Lupeol also possesses antiseptic and analgesic properties.
<u>Sugars :</u> Monosaccharides: glucose & fructose Polysaccharides: gluco-mannans / polymannos	Anti-inflammatory action Anti-viral, immune modulating activity of Acemannan
<u>Vitamins :</u> A, C, E, B, Choline, B12, Folic Acid	Antioxidant(A,C,E): neutralizes free radicals

### Role of *Aloe vera* in skin care

The leaf juice forms an important constituent of a large number of Ayurvedic and Cosmetic preparations (Wealth of India 1985). *Aloe ve-*

*ra*'s power to penetrate deeply into the dermal layers is possibly its greatest asset. Without this ability, all the other properties it possesses would be much less effective. Aloe serves to retain moisture in damaged tissue. Its best ex-

ternal use till date lies in treating burns. Studies have shown that healing is very rapid (one third of normal time) when *A. vera* is used in preference to other medications. Aloe posses the type of enzymatic active that can absorb purulent matter and keep festering sores clean. The penetrating power of Aloe allows water and other moisturizers to sink deep into the skin, restoring lost fluids and replacing the fatty layer. It permits the uronic acids to penetrate deeply and allows the cleansing astringent qualities of Aloe to perform more effectively (<http://www.dpdotcom.com/freebie/Aloe%20Vera%20Extract.pdf>.)

The rich nutrient and medicating substances contained in aloe like polysaccharides and vitamins are widely used in the cosmetics industry in skin creams, lotions, and special treatment preparations aimed at resolving a large number of skin problems. Topical application of the gel, on a daily basis, cleanses and regenerates the skin, supplying the correct amount of vitamins and stimulating blood circulation to guarantee improved oxygenation and rapid expulsion of toxins. Aloe's antioxidants defend it against free radicals. Its anti-aging effects are an added bonus (Bassetti and SaIa 2005) Fresh juice/gel from recently harvested aloe leaves has a local anti-inflammatory and healing effect (Ivy Research 1978) on skin that has been damaged by sun exposure, etc. The presence of small amounts of barbaloin has an antiseptic effect, which may help the healing process by reducing the risk of infection (Danhof 1987).

Besides these known effects of aloe in personal care, some of the recent applications of this wonder herb in the field of cosmetics are reviewed below.

### Wound Healing and Skin repair

Aloe's usefulness in skin care is not limited to wounds, but also extends to abrasions and burns. A topical application of aloe has shown to increase collagen deposition (improving collagen matrix) and reduce inflammation (Jones 2004)

Proteolytic enzymes "digest" waste tissue, including pus, and accelerate the regenerative,

repair stage of tissues in the healing process. The bradykinase enzyme arrests the inflammatory reaction. The barbaloin and the aloetic acid have an antibiotic and antibacterial effect. The isobarbaloin, the ester of cinnamic acid, and the salicylic acid carry out an analgesic or pain-killing action (Bassetti and SaIa 2005)

### Sun-protection

It has been well-demonstrated that unprotected exposure to the sun causes an increase in melanomas, a form of tumor. The enzyme bradykinase in Aloe stops the inflammatory reactions (sunburns) which are caused by an over-exposure to the sun's rays and stimulate immune system intervention. The isobarbaloin, ester of cinnamic acid, and salicylic acid as mentioned above carry out action aimed at easing pain. Acemannan speeds up the repair phase (the regeneration of skin tissues), intervening in the stimulation of macrophages and the increased production of fibroblasts and collagen.

Aloe extracts and Aloin from the plant have spectro-photometric peaks at about 297 nm and hence can act as UV absorbers. The aloe extracts have maximum absorption around 294 nm. It has also been reported that Aloin in extract blocks 20 to 30% of Sun's ultraviolet rays hence acts as a sunscreen (Rajpal 2002) for skin as well as hair.

In this way aloe is finding a wide use both as a sunscreen and sunburn protective ingredient in suncare products.

### Skin Anti-aging properties

The invaluable oligoelements present in Aloe juice, manganese and selenium, constitute the enzymes superoxide dismutase and glutathione peroxidase, recognized as powerful antioxidants and cellular anti-aging agents. Their high antioxidant properties slow down the aging process. This helps cells to become stronger in combating the negative effects caused by oxygen and the broad spectrum radiation to which human skin is exposed daily. The non-essential amino acid, proline, is a constituent of collagen, whose role is to ensure the perfect holding ca-

capacity and elasticity of epithelial tissues. This leads to skin becoming smoother, hydrated and more elastic, protected from free radicals and their degenerative activity resulting in substantial anti-aging effects by constant use of aloe (Bassetti and SaIa 2005).

### Alopecia and baldness

Balding presents itself as a problem of hair loss that is faster than hair re-growth. Aloe juice possesses several substances and a particular characteristic which make it very useful in the treatment of hair loss. The helpful characteristic here is its acidity or, rather, its pH. Aloe's pH level is 6, weakly acid and very close to the normal pH 5 of skin. This characteristic facilitates the penetration of the nutrients to revitalize the hair bulb, strengthening it and promoting its re-growth. In this way, hair loss can be stopped (Bassetti and SaIa 2005)

### Nail inflammation (Onychitis)

Nail inflammations can be very painful because the area around the nail contains many nerve endings. This condition is greatly alleviated in just a short time by the analgesic properties of isobarbaloin and salicylic acid, and the restructuring of the tissues are taken care of by the complex (Bassetti and SaIa 2005).

### Tinea (Athlete's foot)

The infection manifests as irritating vesicles that desquamate and leave an abraded area that is prone to microbial attack. It is a pathology that can spread and worsen easily. Aloe juice or gel creates a barrier with its antimycotic, anti-inflammatory and restructuring properties (Bassetti and SaIa 2005; <http://www.internethealthlibrary.com/Plant-Remedies/AloeVera-research.htm>).

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