

Aloe Vera Chemicals and Usages

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ABSTRACT

The plant of Aloe vera and its usage as drug dates back to 6000 years B.C. The plates belonging to Sumer period during 2200 years BC, show use of this plant as a drug. In that plates, it is written about origin of this plant as Africa, that has 240 species and is ever green. Cleopatra said that her beauty is due to use of *Aloe vera* plant. One prescription that belong to 1550 BC shows *Aloe vera* plant used for different illness. It was known to people in Egypt and also Greece for example Aristoteles explains special characteristics of *Aloe vera*. Jelatin that is extracted from this plant is continuously used to treat burns, cuts and inflamed scars since many years. It is also used in cosmetics sector, medical sector and beverage sectors. It is useful for skin damaged from X ray as reported in many researches in journals related x rays. Because of high concentration of water and oil in this plant, it helps to protect skin from dryness and so the skin that is burnt or cut heals very quickly. On the other hand concentration of glikoz in gelatin, results in high osmotic pressure, that protect skin from live bacteria. *Aloe vera* include "Antrokinon" chemicals that are known as anti virus, anti bacteria and anti cancer. Researchers shows that plant is very helpful for treatment of Psoriasis. *Aloe vera* is very similar to Cactus but belongs to Lily family of *Aloe barbadensis* groups. *Aloe vera* has 400 species but just 2 species; *A. barbadensis* and *A. aborescens* are used for trade in the world. This plant need very less water for living and also can survive on saline soils, beaches and is resistance to diseases and insects. It can live in very hot regions, but cannot tolerate cold. *Aloe vera* grows in South Texas, Florida and South California in USA. It also grows in Mexico, India, South and central America, Africa, Australia and Caribians. This plant is very good adapted in South Iran. It also grows in dryland regions of Iran. This plant was brought to Gheshm (the land in Iran) by businessman many years ago. It is narrated in "Sabir name" in Persian that this plant relaxes men. This plant is put on the grave that relaxes the family of deceased. In Gheshm few hectares of old grave yard has *Aloe vera* as traditional plant of graves. This paper reviews history, its chemicals, medical usage, plant morphology, extracts and agronomy of *Aloe vera*.

Key words: *Aloe vera*, Aloerin, Aloe in famodin, Antrakiyon, skin, burn, dermatology, skin diseases.

Introduction

Ancient Egyptian papyrus and Mesopotamian clay tablets describe aloe as useful in curing infections, treating skin problems and as a laxative [1]. Cleopatra was said to include aloe cream in her beauty regimen [2]. Aloe was used by Hippocrates and Arab physicians, and was carried to the Western Hemisphere by Spanish explorers. Legend has it that Alexander the Great captured the island of Socotra in the Indian Ocean to secure its aloe supplies to treat

his wounded soldiers [3]. Aloe is also popular in both traditional Chinese and Ayurvedic medicine. The Chinese describe aloe's skin and the inner lining of its leaves as a cold, bitter remedy which is downward draining and used to clear constipation due to accumulation of heat (fire) [4] the gel is considered cool and moist. In Ayurvedic medicine, the traditional medicine of India, aloe is used internally as a laxative, antihelminthic, hemorrhoid remedy, and uterine stimulant (menstrual regulator); it is used topically, often in combination with licorice root, to treat

eczema or psoriasis. In Arabian medicine, the fresh gel is rubbed on the forehead as a headache remedy or rubbed on the body to cool it in case of fever, as well as being used for wound healing, conjunctivitis, and as a disinfectant and laxative [5].

Today aloe vera gel is an active ingredient in hundreds of skin lotions, sun blocks and Cosmetics [6]. The gel's use in cosmetics has been boosted by claims that it has similar anti-aging effects to vitamin A derivatives [7]. Aloe first gained popularity in the United States in the 1930's with reports of its success in treating X-ray burns [8,9,10]. Recently, aloe extracts have been used to treat canker sores, stomach ulcers and even AIDS. Some natural health enthusiasts promote aloe gel as a cleansing juice [11]. Some naturopaths promote aloe juice as a way to prevent and treat renal Stones [12]. Many mothers keep a plant handy in the kitchen where it readily thrives in bright sunlight with little care [13]. When faced with a minor burn, a fresh leaf can be cut and the gel of the inner leaf applied directly to the burn immediately after the injury [14]. The inner leaf lining of the plant is used as a potent natural laxative. In a 1990 survey of members of a health maintenance organization, aloe vera was used by 64%; of these, 91% believed it had been helpful [15]. Aloe is also an ingredient in Compound Benzoin tincture [16].

Botany:

Medicinal species: Aloe vera, A. barbadensis (Barbados aloe), *A. vulgaris, A. arborescens, A. ferox* (Cape aloe), *A. perryi* (Socotrine or Zanzibar aloe). There are over 300 species of aloe, most of which are native to South Africa, Madagascar and Arabia [5].



Aloevera: Potentially Active Chemical Constituents From the Gel:

- Polysaccharides: glucomannan and acemannan
- Other: carboxypeptidase, magnesium, zinc, calcium, glucose, cholesterol, salicylic acid, prostaglandin precursors (gamma-linolenic acid [GLA]), vitamins A, C, E, lignins, saponins, plant sterols and amino acids [3,24].

The different species have somewhat different concentrations of active ingredients [17,18].

Common names:

Aloe, aloe capensis, aloe spicata, aloe vera, Barbados aloe, Cape aloe, chirukattali (India), Curacao aloe, Ghai kunwar (India), Ghikumar (India), Indian aloes, kumari (Sanskrit), luhui (Chinese), rokai (Japanese), subr (Arabic), Zanzibar aloe [5,19,20]. The name aloe is derived from the Arabic word *aloe* meaning a shining bitter substance [16].

Botanical family: Liliaceae:

Plant description:

The aloe plant has long (up to 20 inches long and 5 inches wide), triangular, fleshy leaves that have spikes along the edges. The fresh parenchymal *gel* from the center of the leaf is clear; this part is sometimes dried to form aloe vera *concentrate* or diluted

with water to create aloe *juice* products. The sticky *latex* liquid is derived from the yellowish green pericyclic tubules that line the leaf (rind); this is the part that yields laxative anthraquinones [21,22]. The flowers (not used medicinally) are yellow.

Where it's grown:

Aloes are indigenous to South Africa and South America, but are now cultivated worldwide except in tundra, deserts and rain forests. In the US aloe is commercially cultivated in southern Texas [23].

It takes approximately four years to reach maturity and has a lifespan of about 12 years.

From the Latex Leaf Lining:

- Anthraquinone glycosides: aloin, aloe-emodin, barbaloin (15% -30%) [25]. The *gel* or *mucilage* obtained from the flesh of the leaf contains quite different compounds from the bitter *latex* extracted from the leaf lining [26]. Aloe gel is 99% water with a pH of 4.5 and is a common ingredient in many non-prescription skin salves. The gel contains an emollient

polysaccharide, *glucmannan*. It is a good moisturizer, which accounts for its use in many cosmetics [27]. *Acemannan*, the major carbohydrate fraction in the gel, is a water-soluble long chain mannose polymer which accelerates wound healing, modulates immune function (particularly macrophage activation and production of cytokines) and demonstrates antineoplastic and antiviral effects [28,29,30]. The gel also contains *bradykininase*, an anti-inflammatory [31] *magnesium lactate*, which helps prevent itching, and salicylic acid and other *antiprostaglandin* compounds which relieve inflammation.

The leaf lining (latex, resin or sap) contains *anthraquinone glycosides* (aloin, aloe-emodin and barbaloin) that are potent stimulant laxatives. These water soluble glycosides are split by intestinal bacteria into aglycones which effect the laxative action. The laxative effect from aloe is stronger than from any other herb, including senna, cascara or rhubarb root; it also has more severe side effects such as cramping, diarrhea, and nausea [32]. For medicinal use, the leaf lining is dried and the residue is used as an herbal laxative. The products are usually taken at bedtime.

They are poorly absorbed after oral administration, but moderately well absorbed after bacterial hydrolysis. They are eliminated in the urine, bile, feces and breast milk. They turn alkaline urine red [33]. Most herbalists recommend that they be avoided during pregnancy due to the risk of stimulating uterine contractions and also avoided during lactation due to the risk of excretion in breast milk [34]. Aloe is seldom recommended as a first choice among laxative preparations due to the severe cramping and nausea associated with its use.

It is used for; Gastrointestinal/hepatic, Gastric and duodenal ulcers (gel) [34], Reproductive: Emmenagogue (leaf lining; traditional use) Aloe extracts at doses of 100 – 150 mg/kg had no abortifacient effects in pregnant rats [20], Immune modulation: Immunostimulant and anti-inflammatory (gel) [35,36], In a case series of 14 HIV-1+ patients who were prescribed 800 mg/day of acemannan, there was a significant increase in the number of circulating monocyte and macrophages which mirrored clinical improvements [37]. In a pilot study in HIV-infected persons acemannan increased the number of white blood cells and improved symptoms [38].

Aloe extracts also increased phagocytosis in asthmatic adults [39]. Antimicrobial: Antibacterial, antiviral, antifungal (gel), Antiviral, Acemannan acts alone and synergistically with azidothymidine (AZT) and acyclovir to block reproduction of Herpes and the AIDS virus [40,41,42], Antifungal Aloe extract treatment of guinea pig feet that had been infected with *Trichophyton mentagrophytes* resulted in a 70% growth inhibition compared with untreated animals [43].

Skin and Mucus Membranes:

In humans, aloe has been reported to accelerate healing from deep scrapes, frostbite, flash burns of the conjunctiva, and even canker sores [26,44,45,46,47,48,49,50,51]. Only one study has had an opposite effect; that is, aloe-treated surgical wounds healing by secondary intention took longer to heal than comparison wounds [52]. Despite the conflicting research, some dentists and otolaryngologists use aloe gel to promote healing in injured tissues in the mouth, nose, sinuses and ear [53].

Aloe gel has most often been used as a topical treatment for burn wounds [54]. In a study of 27 adults with partial thickness burns, those treated with aloe healed an average of six days faster than those treated with Vaseline gauze [55]. Psoriasis remedy In a 1995 double-blind, placebo controlled study of aloe's effect on 60 patients with psoriasis vulgaris, an aloe vera extract (0.5%) in a hydrophilic cream resulted in a significant clearing of the psoriatic plaques in 83.3% of the aloe-treated patients versus 6.6% of the placebo group [56]. The aloe treatment was well tolerated with no adverse drug-related side effects.

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