

# Phytochemistry, Health Benefits and Toxicological Profile of Aloe Vera Linn. (Liliaceae)

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## ABSTRACT

*Aloe vera* Linn (LILIACEAE) is a succulent, perennial, armed herb, with pulpy leaves. Two major products derived from the leaves are yellow, bitter juice aloin and the gel rich in polysaccharides. It also includes vitamins, enzymes, anthrones, chromones and many other primary and secondary metabolites. All these are used as active ingredients in laxative and anti-obesity medicines as wound healer in various cosmetic and pharmaceutical formulations. The present study deals about the phytochemistry, multi-dimensional health benefits and toxicological profile of *Aloe vera*.

## 1. Introduction

*Aloe vera* is a succulent xerophytes which is able to use crassulacean acid metabolism in photosynthetic pathway that involves the formation of malic acid (Boudreau *et al*, 2006), Davis *et al*, 2006).

Habitat : Warm and dry climate all around the year (Raphael, 2012).

Phytochemistry : The pulp of its leaf contains proteins, chromones, lipids, anthraquinones, amino acids, vitamins, enzymes, inorganic compounds and different types of carbohydrates (Hamman, 2008).

- Anthraquinones (= Anthrones) : *Aloe vera* contains two classes of aloins i.e. nataloins which yields aloetic picric acid as well as oxalic acid with nitric acid and second one barbaloins, which yield aloetic acid, chrysammic acid, picric and exalic acid. Nataloin forms bright yellow scales while barbaloin forms yellow prismatic crystals. It provides 12 anthraquinones which are phenolic compounds with laxative properties. Aloin and emedin act as analgesics and antivirals (Surjushe *et al*. 2008)

- Chromones : 8-c-glycosyl; isoaloesin-D; isorabaichromone neoaloesin -A.

- Enzymes : Phosphatase, amylase, carboxypeptidase, catalase, Cyclooxygenase, Lipase, cyclooxygenase, oxidase, carboxylase, super oxide dismutase, bradykinase, phospholipase.

- Inorganic substances : Calcium, chlorine, chromium, copper, iron, magnesium, manganese, potassium, phosphorus, sodium, zinc.

Note: All inorganic substances are essential for proper enzyme system functioning in different metabolic pathways and few are antioxidants.

- Hormones : Auxins, gibberellins

Note : Help in wound healing with anti-inflammatory action.

- Organic compounds : Arachidonic acid,  $\gamma$ -linolenic acid, steroids, triglycerides, triterpenoid, lignins, potassium sorbate, salicylic acid, uric acid.

- Carbohydrates : Pure mannan, acetylated mannan, galactan, pectic substances cellulose xylan, acetylated glucomannan (Hutter *et al*. 1996).

- Proteins : Lectins, lectins – like substances.

- Saccharides : Mannose, glucose, aldopentose.

- Vitamins : A, C, E and B - complex (= B1, B2, B6).

- Fatty acids : Cholesterol, lupeol, Campesterol and B-sisosterol.

Note: The respective fatty acids are highly effective in the treatment of burns, cuts, scrapes, abrasions, allergic reactions, etc

## 2. Materials and methods

Excursion trips were organized to collect *Aloe vera* from different parts of our area and pressed under herbarium press for a week. The dried plants were then mounted on herbarium sheet measuring 42x28 cm for proper identification.

## 3. Results and discussions

Health Benefits:

- Aids in digestion : Its juice helps in gastric disorder. It encourages the bowels to move and helps with elimination if a person is constipated (Gabriel 2017). It also help in slow down diarrhoea by consumption fresh juice.
- Energy level booster : Intake of *Aloe vera* juice allows energy level to increase and also helps in maintaining healthy body weight. It contains vitamins and many minerals which helps in nerves and muscle performance (Zhang and Tizard 1996).
- Immunity builder : *Aloe vera* works as an immune modulator. It improves the weak immune system and takes care of the diseases like cold, fatigue and other diseases possibly caused by a low immune system (Surjushe *et al*, 2008) *Aloe vera* juice stimulates macrophages the white blood cells against viruses.
- Inflammation reducer : It improves joint flexibility and helps in the regeneration of body cells. It strengthen joint muscles which therefore reduces pain and inflammation in aged joints.
- Anti-stress property : *Aloe vera* leaf juice is helpful in smooth functioning of the body machinery. It reduces cell damaging process during stress condition and minimizes biochemical changes in the body.
- Cosmetic and skin protection : *Aloe vera* jelly is used as skin tonic in cosmetic industry (Kaushik *et al* 2016). It is extensively used to heal skin wounds, burn and helps in speeding post-surgery recovery. The fresh gels are also applied externally on dry skins to give

them glowing effect, reducing acne, pimples, sunburn etc. It reduces the production and release of skin keratinocyte derived immunosuppressive cytokines such as interleukin - 10 (IL - 10) and hence prevents UV - induced suppression of delayed type hypersensitivity.

- Moisturizing and Anti-ageing agent : *Aloe Vera* gel helps to fight against the dry skin and shingles; reduce psoriasis, warts and ageing. Muco-polysaccharides present in its jel help in binding moisture of skin.
- Laxative effects : *Aloe vera* gel is also known for producing laxative effects. Anthraquinones present in gel are a potent laxative. If stimulates mucus

secretion, increase intestinal water content and intestinal peristalsis ( Sahu *et al.*, 2013).

- Toxicological effects : In spite of all the beneficial effects of *Aloe vera* gel, it can also have certain side effects that may affect overall human health as such –
  - Many people are allergic to its gel which can cause stomach issues like irritation, stomach cramps and low potassium levels.
  - Consuming its juice might cause the blood sugar levels to drop.
  - As the juice may Lower the levels of potassium in the body causing further irregular heartbeat, weakness and fatigue, it is unsafe for elderly and sick people.

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