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ALOE VERA A MAGICAL REMEDIES OF NATURE

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Abstract: *Aloe vera* is the oldest medicinal plant ever known and the mostly applied medicinal plant in the world. *Aloe vera* belongs to the family Liliaceae, commonly known as Ghrit Kumari, from ancient time by totemic people it is used as food and therapeutic agent for treatment of various disorders. The whole plant contains large number of chemical constituents like minerals, enzymes, sugars, vitamins, saponins, sterols, lignin, amino acids and salicylic acids. Aloe vera gel has potent antioxidant activity due to its anti-aging property now a day it is widely used as a cosmaceuticals agent by man and woman for protection of skin from UV rays of sun light.

Keywords: *Aloe vera*, Anti-oxidant, Aloe-emodin, Immunomodulator, Laxative, Anti cancer.



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1. INTRODUCTION

It is worldwide known that Ayurveda is a traditional medicine system which goal is to restore the mental, physical and emotional balance in patient and also help in improving, preventing and treating many modern diseases¹. Now a day, the demand of herbal medicines continually increase in the developing countries not only due to its low cost but also due to its better compatibility with human body and have less side effect as compare to synthetic drug². According to WHO, 80% population of world still depend on traditional medicines³. The aloe word originated from the Arabic word 'alloeh' which means bitter, this bitterness is found as liquid in leave part of plant⁴. It is also acknowledged as lily of desert "The plant which possesses various magical healing properties"⁵. It belongs to family Liliaceae. Aloe genus is a succulent herb have cultivated in tropical and subtropical areas of the world⁶. More than 400 species of *Aloe vera* are found in the world mainly in the dry regions of Asia, Europe, Africa and America in which only two species are cultivated for the commercial purpose⁷. Its leaf contain about 75 active constituents like different type of Enzymes, Vitamins (Vit A, C, E, B₁₂ and Choline), sugars (monosaccharides and polysaccharides), saponins (Antiseptic and foaming agent property), minerals, lignin (capacity of penetrating the human skin), salicylic acids and amino acids (20 non-essential amino acids and 7 essential amino acids)⁸. The *Aloe vera* leaves are used internally and externally for the treatment of diabetes, constipation, peptic ulcer, immune system enhancement, skin irritation, burn, ulcer, to stimulate cell regeneration, scalds etc⁹.

Common name:

In India, the *Aloe vera* plant is known by different names including: Aloe, Chirukattali, Ghai kunwar, Gheekumari (hindi), Kumari (Sanskrit), Brahmi (kannad), Khorpad (Marathi), Kathalai (Tamil) and in other country it is known as: Luhui (Chinese), Laloi (Haiti), Lohoi (Vietnam), Nohwa (Korean), Sabilla (cuba), Rokai (Japanese), Subr (Arabic), Socotrine aloe¹⁰. The different species of Aloe are *Aloe vera* Linn., *A. barbadensis* Miller, *A. chinensis* Baker, *A. ferox* Miller, *A. indica* Royle, *A. perryi* Baker, etc. According to WHO monograph more acceptable and the legitimate name for this species is *Aloe vera* linn¹¹.

2. Botanical Description:

Aloe vera (synonym: *Aloe barbadences*) are stem less succulent plant growing to 80-100 cm in length¹², belong to family Liliaceae, with strong, perennial and fibrous roots. The tissue present in centre of leaf contains gel called *Aloe vera* gel¹³. Leaves are numerous and fleshy, proceeding from the upper parts of roots and contain thick, tapering, narrow with spinney teeth and the colour of the leaves green to greyish-green. These leaves are about 30-60cm long, 1.8cm thick and 10cm broad¹⁴. During the season of summer, the flower are produced up to 90cm in height and every flower having a yellow tubular corolla about 2 to 3cm long¹⁵.

3. Chemical composition:

Different type of chemical compounds is present in Aloe in which more than 200 compounds are biologically active. The pulp that found in Aloe leaf contains minerals, enzymes, sugars, vitamins, saponins, sterols, lignin, amino acids and salicylic acids. The bitter yellowish exudates contain glycosides and 1, 8 dihydroxyanthraquinone derivatives¹⁶.

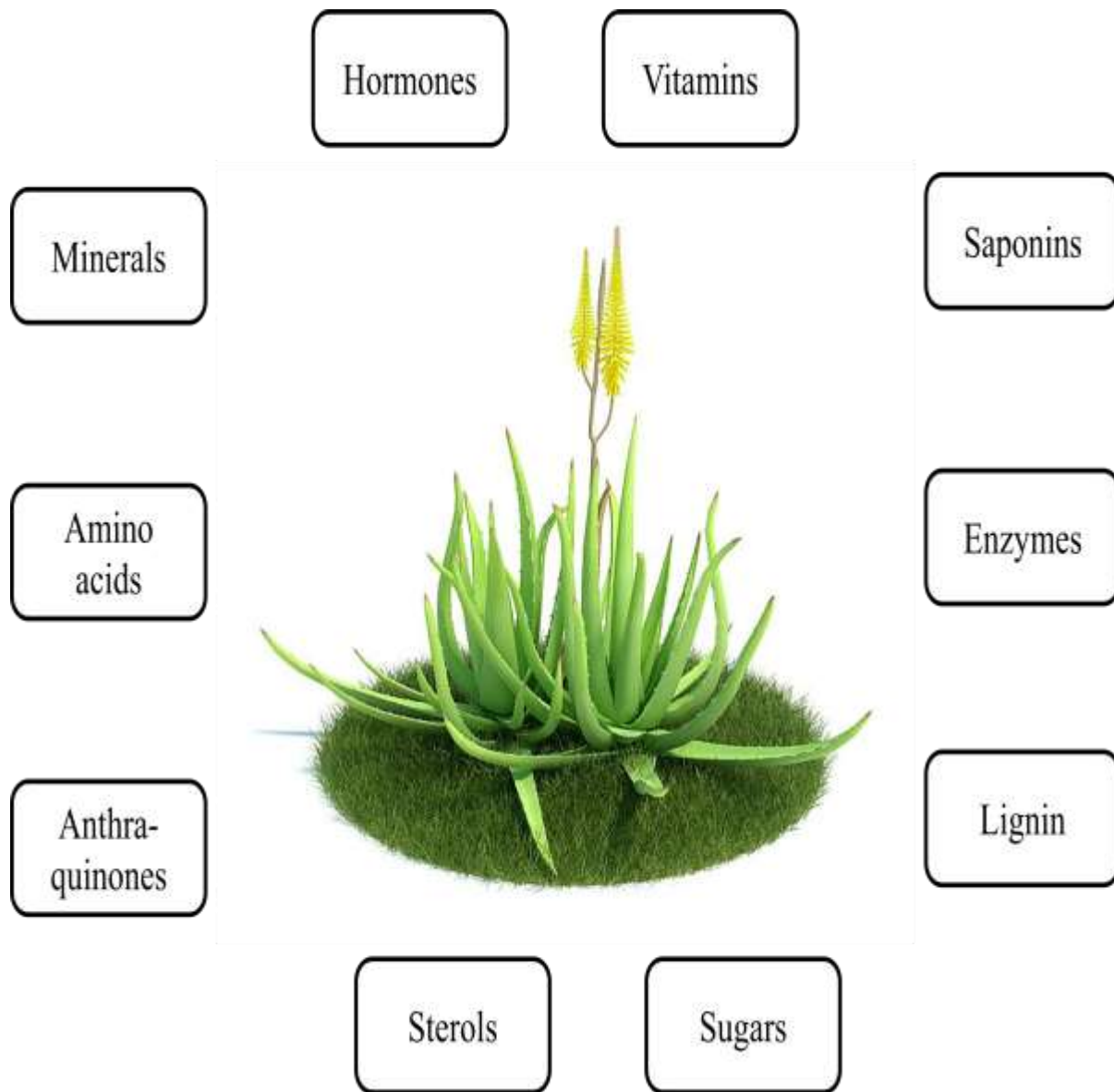


Figure 2: Represents active constituents of *Aloe vera*

Table 1. Chemical constituents of *Aloe vera* leaf pulp and exudates

Class	Number and identification compounds
Anthraquinones	<i>Aloe vera</i> contain 12 types of Anthraquinones these are Aloe-emodin, aloetic acid, anthronol, aloin A & B(barbaloin), isobarbaloin, emodine, ester of cinnamic acid.
Amino acids	It provides various 20-Non-essential amino acids and 7-essential amino acids these are alanine, arginine, aspartic acids, glutamic acids, glycine, histidine, leucine, lysine, proline, valine, threonine, tyrosine.
Enzyme	Eight enzymes isolated from <i>Aloe vera</i> these are Anthranol, barbaloin, chrysophanic acid, ethereal oil, ester of cinnamonic acid, resistannol, isobarbaloin, smodin.
Inorganic compound	It provides 9 minerals: Calcium, copper, Zink, Potassium, copper, iron, sodium, manganese, chromium.
Sugars	I contain both monosaccharides and polysaccharides these are glucose, fructose, glucomannans and polymanose.
Carbohydrate	Pure mannan, acetylated mannan, glucogalactomannan, galactogalacturan, arabinogalactan, galactan, acetylated glucomannan, pectic substance, xylan, celluliose.
Hormones	Two Hormones are known which are gibberllins, auxins.
Vitamines	It contains many vitamins: A, B, C, E, folic acids, β -carotene, choline, B ₁₂ .
Salicylic acid	<i>Aloe</i> contain aspirin like compound which shows analgesic activity
Saponins	Glycosides.

4. Structural composition of leaf:

The *Aloe* leaf can be divided into two parts, in the outer part vascular bundles are present named green rind, and the second is inner colourless parenchyma contain *Aloe vera* gel. Inner central part of leaf is known by using different term such as mucilaginous gel, inner pulp, inner

gel, mucilaginous jelly and leaf parenchyma tissue. The pulp contain viscous clear liquid including the organelles and cell wall¹⁷.

The pulp have three structural components are the viscous liquid, cell walls and the degenerated organelles. These components are different from each other in term of sugar composition and morphology as shows in Figure-1¹⁸. The gel contain approx. 99% of water while raw pulp contain approx. 98.5% water^{19,20} and the rest 0.5-1% solid part consist many compounds like water, enzymes, fat soluble vitamins, minerals, phenolic compounds polysaccharides and organic acids²¹.

5. Cultivation and Propagation:

The production of Aloe leaf is lack to meet the demand of industry²². It grows in marginal to submarginal soils having low fertility. The plant have tendency to bear the high pH, sodium and potassium salts. Its growth found to be faster in heavier soil like black cotton soil that mainly found in central India. The Aloe plant does not penetrate below 20-30cm in the soil. The propagation is done by rhizome cutting or root suckers. The root suckers (medium size) carefully dug out and planted directly in the field²³ in the month of July to August during monsoon season to get better subsequent growth of the plant.

6. Therapeutic and medicinal uses:

1. Wound Healing and burn:

There are 3 phases in which wound healing process completed, the first is inflammation phase, in second phase removal of dead cells take place and the third is proliferation phase (formation of fibrous tissue and regeneration of epithelial cell)²⁴. Various researchers has been reported that the *Aloe vera* gel heals internal and external wound healing property like peptic ulcer, dermal and sub dermal tissue²⁵. Mannose-6-phosphate has been attributed to wound healing property in *Aloe vera*²⁶. It increases the collagen formation and wound tensile strength. Aloe gels also inhibit bradykinin which is powerful pain producing and proinflammatory agent and inhibit thromboxane formations which cause vasoconstriction. In recent review it has been suggested that the application of Aloe gel heal the first and second degree burns tissue injury²⁷.

2. Skin & body Anti-aging and Antioxidant properties:

As the various evidences reported that the Aloe leaves extract contain some phenolic compound has potent anti-oxidant activity that are in Aloe emodin, Aloe barbendol, Aloe chryson, barbaloin²⁸ and other flavonoids, α -tocopherol, ascorbic acid that also possess anti-oxidant property²⁹. Many other valuable substances present in Aloe like ions- manganese, selenium, enzymes superoxide dismutase (SOD) and glutathione peroxidase identified as anti-

aging and antioxidant agent. It is suggested that Aloe vera extract in diabetic rats increased the antioxidant enzyme (like SOD) activity and decreased the lipid peroxidation³⁰.

3. Protection of skin from UV rays:

Aloe vera gel protects the skin from all type of UV rays therefore it is incorporated in herbal sunscreen lotions as a main constituent. The extract of Aloe produced skin hydration and occlusive layer formation on the skin³¹.

4. Moisturizing agent:

Aloe vera gel is amazing moisturizing agent, enhance the integrity of skin and decrease the wrinkle and erythema appearance. This gel produces cooling and soothing effect on the skin. The property of binding the moisture on skin is due to the presence of Muco-polysaccharides. Amino acids and astringent are responsible for soften the hard skin cells and tighten the pores³².

5. Anti-Inflammatory action:

Hutter et.al. reported that the c-glycosyl chromone isolated from *Aloe vera* gel extract responsible for anti-inflammatory activity. Aloe vera reduced the prostaglandin E2 (PGE2) production and inhibited the Cyclooxygenase(COX) pathway from arachidonic acid^{33,34}. The isolated peptide bradykinase responsible for breakdown of bradykinin(Inflammatory substance) that is responsible for stimulation of pain³⁵.

6. Antitumor activity:

Mainly two agents are responsible for anti-cancer effects includes polysaccharides and glycoproteins(lectins). As already described that different type of glycoproteins are found in Aloe gel. These proteins have anticancer and antiulcer effects and have ability to enhance the proliferation of dermal cells^{36,37}. According to novel studies, the binding of benzopyrene to hepatocytes of primary rats inhibited by polysaccharide fraction and prevented the benzopyrene-DNA adducts formation that is responsible for cancer initiation^{38,39}.

7. Immunomodulatory effects:

A number of studies showed that the Aloe vera gel contain polysaccharides which are responsible for immunomodulatory activities. Polysaccharides activated the macrophage cells which are responsible for generation of nitric oxide and secrete different cytokines (e.g. IL-1 & 6, TNF- α , INF- γ)^{40,41}. A few immune reaction that are specific for acemannan same as other polysaccharides include activation of the antigenic response of human lymphocytes. However glycoproteins (lectins) found in *Aloe vera* gel showed other immunomodulatory effects⁴².

8. Laxative effects:

Aloe latex consist of Anthraquinone glycosides which is commonly used in the treatment of constipation^{43,44}. Anthraquinones have potent laxative property, it stimulate the secretion of mucus, increase intestinal water content and increase peristalsis movement of intestine⁴⁵. The aloin A and B, 1,8-dihydroxyanthracene glycosides are the main active constituent of *Aloe vera*⁴⁶. Aloin A & B after oral administration, are not absorbed in upper part of intestine, in colon it hydrolysed and converted to the active metabolites⁴⁷.

9. Antidiabetic effect:

The five Phytosterols of *Aloe vera* namely 24-methyl-lophenol, 24-methylenecycloartanol, cycloartanol, lophenol, 24-ethyl-lophenol in type-2 diabetic mice showed anti-diabetic effect and it contain polysaccharides which increase insulin level in blood^{48,49}. For the treatment of diabetes mellitus different medicinal plant have been studied like *Allium sativum*, *Trigonella foenum graecum*, *Gymnema slyvestre*, *Syzigium cumini* and also *Aloe vera*. The hypoglycemic trace elements e.g., Cr, Zn, and Mn are present in *Aloe vera* gel extract which potentiate insulin action and lower the blood glucose level⁵⁰.

10. Antiseptic effect:

Due to the presence of 6 compounds namely salicylic acids, urea nitrogen, lupeol, cinnamic acids, sulphur and phenols *Aloe* have antiseptic effect. These compound responsible toinhibited the growth of bacteria, viruses and fungi⁵¹.

11. Effect on ulcers and gastric acid secretion:

The *Aloe vera* gel has tendency to cure stomach ulcer and prevent its formation in both human and animal but *Aloe* gel have no preventive effect against ethanol-induced gastric ulcer in rat. Through several mechanisms, *Aloe vera* has been attributed the anti-ulcer activities including healing effects, anti-inflammatory effects, regulate gastric acid secretion and mucus stimulatory effects⁵². It was investigated that the ethanolic extract of *Aloe vera* showed positive effect on hydrochloric acid and gastric acid secretion induced gastric mucosa damage in rats. The *Aloe* juice helps in relieving gastrointestinal, ulcerous and kidney problems in addition it also play role in bowel syndrome, digestive problem, peptic ulcer, colitis, duodenal ulcer.

12. Hepatoprotective effects:

An aqueous ethanolic extract of *Aloe vera* (dried leaves) has ability to reduce the liver damage against carbon tetrachloride induced model in mice. *Aloe vera* also has capacity to preserving the metabolizing enzyme of the liver⁵³.

Conclusion: *Aloe vera* is medicinal plant have the great demand in the market across the world due to its expanded medicinal, nutraceutical and cosmaceutical uses. The active chemical constituents covered in its succulent leaves have the power to make nice human life and health in a myriad way. The plant has importance in daily life to soothe a variety of skin disorder such as burn, skin moisturizing, mild cut and anti-ageing along with anti cancer, hepatoprotective, anti ulcer, immunomodulator, antiseptic and anti diabetes effect. *Aloe Vera* plant is required for the human kind of better utilization of emphasis research and *Aloe Vera* plant is a gift of nature to humanity for burn, medicinal application and cosmetic. We should be thankful to nature for its never ending gift.

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