



## MIRACLE FACTS OF ALOE VERA

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Article Received on 23/08/2017

Article Revised on 13/09/2017

Article Accepted on 04/10/2017

### ABSTRACT

Aloe vera is one of the oldest traditional plant that has been used in the field of cosmetology and medicine. It has also been used in the field of therapeutic dentistry in conditions like aphthous stomatitis, oral lichen planus, oral submucous fibrosis and bleeding gums. It has anti-bacterial, anti-viral, anti-fungal, anti-inflammatory and anti-oxidant effect. This article elaborates the various applications of aloe vera in dentistry.

**KEYWORDS:** Aloe vera, acemannan, anthraquinone, candida albicans.

### INTRODUCTION

The name Aloe vera is derived from the Arabic word “alloeh” and from the Latin word “vera” means “shining bitter substance”.<sup>[1]</sup> Egyptians called aloe as “the plant of immortality.” Aloe vera is one of the oldest medicinal plant belonging to the family Liliaceae. It is a powerful detoxifier, anti-septic and tonic for the nervous system. It also has immune boosting, wound healing, and anti-viral property.<sup>[2]</sup> The leaves of the plant consist of two different parts namely parenchymal tissue and pericyclic tubules.<sup>[3]</sup> The pharmacological actions of aloe vera have been greatly researched both in-vitro and in-vivo including anti-inflammatory, anti-arthritis, anti-bacterial and hypoglycaemic effects.<sup>[4]</sup>

### Composition

Gjerstad et al found that the leaves of the aloe vera plant consist 99.5% of water and 0.0013% protein.<sup>[5]</sup> It also contains around 75 active ingredients, which includes vitamins, enzymes, sugars, minerals, lignin, saponins, salicylic acids and amino acids; numerous monosaccharide's and polysaccharides; several inorganic substances, which includes acid phosphates, alkaline phosphates, amylase, lactic dehydrogenase, and lipase. Numerous organic compounds such as aloin (Barbaloin) and emolin are also present.<sup>[6]</sup> Aloe vera also contains aluminium, boron, barium, calcium, iron, magnesium, sodium, phosphorus, silicon and strontium.<sup>[7]</sup>

The composition of aloe vera is listed below

Anthraquinones	Inorganic	Saccharides	Enzymes
1. Aloin	1. Calcium	1. Cellulose	1. Oxidase
2. Barnaloin	2. Sodium	2. Glucose	2. Amylase
3. Iaobarnaloin	3. Chlorine	3. Mannose	3. Catalase
4. Anthranol	4. Manganese	4. L-Rhamnose	4. Lipase
5. Aloetic acid	5. Magnesium	5. Aldopentose	5. Alkaline phosphatase
6. Anthracene	6. Zinc		
7. Ester of cinnamic acid	7. Copper		
8. Aloe-emodin	8. Chromium		
9. Emodin	9. Potassium		
10. Chrysophanic acid	10. Sorbate		
11. Ethereal oil			
12. Resistanol			

Vitamins	Essential amino acids	Nonessential amino acids	Miscellaneous
1. Vitamin B1	1. Lysine	1. Histidine	1. Cholesterol
2. Vitamin B2	2. Threonine	2. Arginine	2. Triglycerides
3. Vitamin B6	3. Valine	3. Hydroxyproline	3. Steroids
4. Choline	4. Methionine	4. Aspartic acid	4. Beta- sitosterol
5. Folic acid	5. Leucine	5. Glutamic acid	5. Lignins
6. Vitamin C	6. Isoleucine	6. Proline	6. Uric acid
7. Alpha-tocopherol	7. Phenylalanine	7. Glycerine	7. Gibberellins
8. Beta carotene		8. Alanine	8. Lectin like substance
		9. Tyrosine	9. Salicylic acid

### Biological properties of aloe vera

**1) Healing property:** Aloe vera (AV) gel enhance wound healing by increasing blood supply (Angiogenesis), which increase oxygenation in turn.<sup>[8]</sup> Glucomanan, a mannose rich polysaccharide Gebbeerillin (Growth hormone) interacts with growth factor receptors on the fibroblast and stimulates its activity and proliferate, which in turns significantly increases collagen synthesis.<sup>[9]</sup>

**2) Anti-bacterial property:** It has bactericidal action against pseudomonas aeruginosa, Streptococcus pyogenes and streptococcus faecalis.<sup>[10]</sup>

**3) Anti-fungal property:** Purified aloe protein has been found to exhibit potent anti-fungal activity against Candida albicans, Candida krusei and Candida paraprilosis.<sup>[11]</sup>

**4) Anti-viral property:** This action may be direct or indirect. Direct effect is due to anthraquinones and indirect effect is due to stimulation of immune system. It has an anti-viral effect against herpes simplex virus type 1 and 2 and also against varicella zoster, influenza virus and pseudo rabies virus.<sup>[12]</sup>

**5) Effects on the immune system:** Acemannan present in AV stimulates the synthesis and release of IL-1 and tumour necrosis factor from macrophages, which initiates immune system and result in necrosis and regression of the cancerous cells.<sup>[12, 9]</sup>

**6) Anti-tumour effect:** The two fractions from aloe vera that are claimed to have of anti-cancer effects include glycoprotein (lectins) and polysaccharides. An induction of glutathione s-transferase and inhibition of tumour promoting effect of phorbol myristic acetate has been using AV gel in cancer chemotherapy.<sup>[13]</sup>

**7) Anti-septic effect:** AV contains six anti-septic agents; Luperol, salicylic acid, urea, nitrogen, cinnamonic acid, phenols and sulphur that have inhibitory action of fungi, bacteria and virus.<sup>[13, 12, 9]</sup>

**8) Anti-oxidant effect:** Isorabaichromone, feruoylaloetin and p-coumaroylaloetin from aloe vera showed potent free radical superoxide anion – scavenging activity.<sup>[14]</sup>

**9) Anti-inflammatory effect:** Aloe vera inhibits the cyclooxygenase pathway and reduces prostaglandin E2 production from arachidonic acid. This novel anti-inflammatory compound called C-glucosylchromone was isolated from gel extracts.<sup>[15, 9]</sup>

**10) Protective effect:** AV gel has protective effect against radiation damage to the skin.<sup>[9]</sup>

**11) Moisturizing and anti-ageing effect:** It was proposed that the AV gel formulations with higher concentrations (0.25% w/w and 0.5% w/w) improve skin hydration possibly by means of humectant mechanism. It also has cohesive effects on the superficial flaking epidermal cells by sticking them together and softens the skin.<sup>[16]</sup>

**12) Laxative effect:** Anthraquinones present in latex are a potent laxative. It increases intestinal water content, stimulates mucus secretion and increases intestinal peristalsis.

### Aloe Vera in Dentistry

#### 1. Aloe vera in endodontic

Aloe vera has anti-microbial effect against resistant microorganisms found in pulp space i.e. Candida albicans and Enterococcus faecalis. It is also used as an intracanal medicament. It can be used in root canals as sedative dressing and also as file lubricant. The nerve ends in a root canal are very sensitive and aloe vera plays a role greatly reducing its sensitivity.

#### 2. Gingival and periodontal disease

Aloe vera greatly reduces the instances of gum bleeding due to its smoothing and healing properties. It also reduces swelling, soft tissue edema, plaque and calculus formation. Aloe vera mouthwash prevents radiation-induced mucositis by its wound healing and anti-inflammatory mechanism. It reduces oral candidiasis of patients undergoing head and neck radiotherapy due to its anti-fungal and immune-modulatory properties.<sup>[11]</sup> Effective substitute for topical application in the treatment of Oral Lichen Planus, 1-3 tablespoon of AV juice to be used as a mouthwash, then swallowed three time daily.<sup>[16]</sup> Aloe vera as a tooth gel cleanses teeth and gums and effective in fighting cavities similar to toothpaste. AV tooth gel and the tooth pastes were equally effective against Candida albicans, Streptococcus mutans, Lactobacillus acidophilus, Enterococcus

faecalis, *Prevotella intermedia* and *Peptostreptococcus anaerobius*.<sup>[15]</sup>

### 3. Pathological conditions

AV gel is effective in decreasing recurrent aphthous stomatitis and its wound size. Acemannan, which is one of the polysaccharide components in aloe vera has been used for the treatment of oral aphthous ulceration in patients who wish to avoid the use of steroid medication. Aloe vera has also been used to treat oral lichen planus. Long term steroids therapy is associated with multiple systemic complications which provide aloe vera an added advantage due its lesser side effects.

### 4. Dental implants

AV gel when placed around dental implants is found to be effective in reducing inflammation. It reduces inflammation by its antimicrobial and anti inflammatory effects.<sup>[17]</sup>

### 5. Denture adhesive / denture cleanser

AV gel can be used as soft denture liners and it is effective due to its anti-fungal nature. Acemannan present in AV gel make it sticky and viscous which in turn act as an adhesive agent.<sup>[17]</sup>

### Contraindications

It is contraindicated in patients known allergic to plants in the Liliaceae family.<sup>[16]</sup> It should not be used during pregnancy or by lactating mother except under medical supervision. Oral use of aloe vera is contraindicated in children below 10 years of age. Combined use of Aloe vera and furosemide may increase the risk of potassium depletion. It also decreases blood sugar levels and hence may interact with oral hypoglycaemic drugs and insulin.<sup>[17]</sup>

### Side Effects:

**Topical Application:** It may cause redness, burning, stinging, sensation, and rarely generalised dermatitis in sensitive individuals. Allergic reactions are mostly due to anthraquinones, such as aloin and barbaloin.<sup>[17,13,9]</sup>

**Oral Use:** Abdominal cramps, diarrhoea, red urine, hepatitis, dependency or worsening of constipation. Prolonged usage may increase the risk of colorectal cancer. Laxative effect may cause electrolyte imbalance (low potassium levels).<sup>[17,9]</sup>

### CONCLUSION

Aloe vera finds an assuring role in various branches of dentistry in the near future. Proper knowledge of ancient medicine and applying of that knowledge to the treatment plan are essential in confirming success in dental therapeutic agent. In future, numerous upcoming studies are on the way to promote the effective antimicrobial property of the miracle plant.

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