

**NATURAL HERB ALOE BARBADENSIS MILLER – A REVIEW****Dr. Shridevi Adaki<sup>1</sup>, Dr. Amol Karagir<sup>2</sup>, Dr. Anupama Bijjal<sup>3</sup>, Dr. Bhagyashree Anigol<sup>4</sup> and Dr. Raghavendra Adaki<sup>5</sup>**<sup>1</sup>Associate Professor, Dept. of Oral Medicine and Radiology B. V. D. U. Dental College, Sangli – 416414.<sup>2</sup>Assistant Professor, Dept. of Oral Medicine and Radiology B. V. D. U. Dental College, Sangli – 416414.<sup>3</sup>Associate Professor Dept. of Rasa Shastra and Baishajya Kalpana SVM Ayurvedic Medical College, Ilkal – 587125.<sup>4</sup>Associate Professor, Dept. of Periodontology P. M. N. M. Dental College, Bagalkot.<sup>5</sup>Professor and HOD, Dept. of Prosthodontics B. V. D. U. Dental College, Sangli – 416414.**\*Corresponding Author: Dr. Shridevi Adaki**

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**ABSTRACT**

Aloe barbadensis miller or aloe vera is one among the various species of aloe plant. It is one of the oldest medicinal plants. It has got wider spectrum of beneficial effects. It is used in many streams of medicine like Ayurvedic, Homoeopathic, siddha, unani and Allopathic. The beneficial effects are because of its content which is rich source of over 200 nutrients, including vitamins, minerals, enzymes, sugars, lignin, saponins, sterols, amino acids, salicylic acid, etc. and other bioactive compounds. In this review the contents, functions of the contents, medicinal, dental uses and contraindications of the aloe vera are discussed briefly.

**KEYWORDS:** Aloe vera, uses in dentistry, medicinal uses.**INTRODUCTION**

Aloe barbadensis Miller or Aloe Vera is also referred as the “burn plant,” “lily of the desert” or the “wonder plant.” In Ayurveda it is called as Ghrithkumari and gayatri plant. Aloe Vera is a widely used herb in Ayurveda. The sanskrit name for Aloe is ‘Kumari’ meaning young girl. This name evolved from the fact that Aloe Vera is widely used in both menstrual problems and skin problems in young women. Also, the plant looks young even when it is old.

Description of aloe vera in ayurveda according to ancient verse<sup>[1]</sup> is as follows: It states the names and the properties of Ghrithkumari. It is known as kumara, gruha Kanya, kanya and ghrithkumarika. It is purgative in nature with cold potency, bitter and sweet in taste, good for eyes, rejuvenating, provides strength to the body, aphrodisiac and balances vata. It manages spleen and liver disorders, kapha fever, skin burns, skin diseases and blood impurities.

Ghrithkumari is described as multi functional herb in Ayurveda as blood purifier, anti inflammatory, diuretic, uterine tonic, spermatogenic, laxative and fever reliever.<sup>[2]</sup> It is used in ayurvedic formulations as appetite stimulant, purgative, emmenagogue and antihelminthic, cough, colds, piles, debility, dyspnoea, asthma and jaundice.<sup>[3]</sup>

**Botanical Description of Aloe Vera**

The plant is a coarse looking perennial with short, thick somewhat divided stem, 30 to 60 cm high. The leaves are glaucous green, sessile, crowded, lanceolate, Erect spreading rather than concave, spiny toothed at margin, about 30 to 60 cm long, 10 cm broad and 1.8 cm thick full of juice. The scape is longer than leaves and is scaly and branched.<sup>[4]</sup> The flowers are pendulous, imbricated and yellow in colour. The plant reaches maturity after four years and has leaves with a length averaging between two and three feet and a base width from three to five inches, each leaf weighing from two to four pounds. The plant’s complete life cycle is twelve years. It produces an average of twelve to thirty leaves.<sup>[5]</sup> The odour is characteristic while the taste is nauseous and bitter.

**Layers of leaves**

Leaves have three layers. The outer most layers consist of 15 - 20 cells thick protective layer synthesizing carbohydrates and proteins.<sup>[6]</sup> The bitter yellow latex containing anthraquinones and glycosides has been reported from the middle layers of leaf.<sup>[8]</sup> The juice that is originated from cells of the pericycle and adjacent leaf parenchyma, flowing spontaneously from the cut leaf get dried with or without the aid of heat and get solidified.<sup>[7]</sup> The parenchymatous tissue or pulp shown to contain proteins, lipids, amino acids, vitamins, enzymes, inorganic compounds and small organic compounds in addition to the different carbohydrates. The innermost

layer of leaf gel contains water upto 99%, with glucomannans, amino acids, lipids, sterols and vitamins,<sup>[8]</sup> (table 1).

**Table 1: Chemical composition and properties of *Aloe vera*.**<sup>[9]</sup>

| Constituents    | Number and identification  | Properties and activity  |
|-----------------|--|--|
| Amino acids     | Provides 20 of the 22 required amino acids and 7 of the 8 essential ones   | Basic building blocks of proteins in the body and muscle tissues         |
| Anthraquinones  | Provides Aloe emodin, Aloetic acid, alovin, anthracene   | Analgesic, antibacterial   |
| Enzymes         | Anthranol, barbaloin, chrysophanic acid, smodin, ethereal oil, ester of cinnamonic acid, isobarbaloin, resistannol | Antifungal and antiviral activity but toxic at high concentrations       |
| Hormones        | Auxins and gibberellins  | Wound healing and anti-inflammatory                                      |
| Minerals        | Calcium, chromium, copper, iron, manganese, potassium, sodium and zinc   | Essential for good health  |
| Salicyclic acid | Aspirin like compounds   | Analgesic  |
| Saponins        | Glycosides   | Cleansing and antiseptic   |
| Steroids        | Cholesterol, campesterol, lupeol, sistosterol  | Anti-inflammatory agents, lupeol has Antiseptic and analgesic properties |
| Sugars          | Monosaccharides: Glucose and Fructose<br>Polysaccharides: Glucomannans/polymannose                                 | Anti-viral, immune modulating activity of acemannan                      |
| Vitamins        | A, B, C, E, choline, B12, folic acid   | Antioxidant (A, C, E), neutralises free radicals                         |

### Medicinal Properties of Aloe Vera

Aloe Vera contains "aloin" which is mixture of glucosides and is active constituent of various drugs. Indian aloe is a rich source of over 200 naturally occurring nutrients such as vitamins, minerals, sugars, amino acids, enzymes and acids, which helps in digestion system.<sup>[10]</sup> The healing properties of aloe are due to the presence of aloectin B, which stimulates the immune system. The Food and Drug Administration of the USA has approved the developmental study of *Aloe Vera* for the treatment of cancer and AIDS.<sup>[11]</sup> This is attributed to the antiviral and immune modulating properties of acemannan.<sup>[12]</sup> Traditionally aloe is extensively used in treating urine related problems, pimples, ulcers etc. It is also used in gerontology and rejuvenation of aging skin.<sup>[13]</sup> The bioactive compounds are used as astringent, haemostatic, anti diabetic, antiulcer, antiseptic, antibacterial, anti-inflammatory, antioxidant and anticancer agent, also effective in treating stomach ailments, gastrointestinal problems, skin diseases, constipation, radiation injury, wound healing, burns, dysentery, diarrhea and in the treatment of skin diseases.<sup>[14]</sup> Currently the plant is widely used in skin care, cosmetics and as nutraceuticals. Co-treatment with *Aloe Vera* was effective in reducing genotoxicity of the direct-acting mutagen. *Aloe Vera* leaf gel act against various micro organisms and increases total white blood cell count and macrophages.<sup>[11]</sup> In acute gastric mucosal lesions, the extract dose dependently inhibits gastric acid secretion and provides gastro protective activity. *Aloe Vera* contains salicylic acid which is an aspirin like compound with anti inflammatory, analgesic and antibacterial properties.<sup>[15]</sup> Another constituent of *Aloe Vera* includes saponins. These are soapy substances from the gel that are capable of cleansing and having

antiseptic properties. The saponins perform strongly as anti-microbial against bacteria, viruses, fungi and yeasts.<sup>[16]</sup> The plant sterols or phytosteroids in *Aloe Vera* include cholesterol, campesterol, lupeol, and  $\beta$ -sitosterol. The plant steroids have fatty acids in them that have antiseptic, analgesic, and antiinflammatory properties. *Aloe Vera* shows properties such as: astringent, emollient, antifungal, and cell proliferant which are helpful in healing wounds and burns. Generally aloe juice is a good tonic for skin and digestive disorders.<sup>[17]</sup> It will help bring the body to a pH balance while being beneficial to the whole gastro-intestinal system. The enzymes in *Aloe Vera* aids the digestion and absorption of nutrients, helps control blood sugar, increases energy production, promotes cardiovascular health, improves liver function, and boosts the immune system.<sup>[18]</sup> The pulp is used extensively in Siddha medicines for treating constipation, enlargement of spleen, zymotic disease and chengamaari.<sup>[19]</sup> *Aloe Vera* also contains the trace minerals rhodium and iridium used in cancer and tumor research experiments.<sup>[11]</sup> Aloe also contains three anti-inflammatory fatty acids such as cholesterol, campersterol and  $\beta$ - sitosterol (plant sterols). These agents are the source for aloe's effectiveness in treating all kinds of internal and external inflammations including burns, cuts, scrapes, acid indigestion, ulcers and other inflammations of the liver, kidney, colon and pancreas, among others. Additionally,  $\beta$ -sitosterol is a powerful agent in helping to lower bad cholesterol levels.

### Applications of Aloe Vera in Dentistry

Aloe vera is used in dentistry as active ingredient in tooth pastes, tooth gels and mouth rinse for plaque control, treatment of various oral lesions, halitosis and

gingivitis, as decontaminant in endodontics, in extraction sockets, dental implants and in denture care.<sup>[20]</sup>

**Apthous ulcer:** Aphthous ulcers are painful oral lesions seen anywhere on oral mucous including gingiva, labial mucosa, buccal mucosa, tongue. Application of aloe vera gel helps in healing of aphthous ulcer and reduces pain associated with it.<sup>[21]</sup> Acemannan, a polysaccharide which is one of the components of aloe vera, is helpful in treating ulcers and to avoid the use of steroid medication.<sup>[22]</sup> US Food and Drug Administration has also found aloe vera is effective alternative to treat oral ulcers.<sup>[23]</sup> A study conducted by Babae *et al.* concluded that 2% aloe vera oral gel was effective in decreasing pain, wound size and also has decreased wound healing period.<sup>[24]</sup>

**Oral lichen planus:** Oral lichen planus is one of the premalignant conditions and most accepted etiology for the condition is stress and immunological alteration. Steroids are been used in treatment as it is immune-suppressor. Use of steroids is associated with multiple systemic complications. Hence use of aloe vera was recommended due to its lesser side effects also considering its effects on immunity. When compared to triamcinolone topical application of aloe vera gave better results.<sup>[24]</sup> Topical applications like lip balm, cream and intake of aloe vera juice helps in healing oral lesions within four weeks as reported by Hayes S M in 1999.<sup>[25]</sup> A study conducted by Choonhakarn *et al.* concluded that aloe vera gel is more effective and safe alternative to placebo in treatment of oral lichen planus.<sup>[26]</sup>

**Oral submucous fibrosis:** Oral submucous fibrosis is premalignant condition in which there is inflammation, stiffness and fibrosis of the oral mucosa leading to burning sensation and reduced mouth opening. Aloe vera when applied topically penetrates and dilates the capillaries which help in wound healing. Aloe vera juice used in doses of two ounces three times a day for three months was effective in treating oral submucous fibrosis.<sup>[27]</sup> Aloe vera when compared to anti oxidants in treatment of oral submucous fibrosis showed better treatment responses like enhanced mouth opening and reduced burning sensation when compared to antioxidant capsules.<sup>[28]</sup>

**Burning mouth syndrome:** Burning and tingling sensation in tongue and lips, bitter taste are symptoms seen in burning mouth syndrome. Topical application of aloe vera gel and 0.5 ml aloe vera juice at 70% three times a day was effective in treating burning mouth syndrome.<sup>[29]</sup>

**Gingivitis and periodontitis:** There are lots of clinical studies done to evaluate the effect of aloe vera on the gingival tissues. Aloe vera is studied as topical application, in the form of mouthwash and in toothpaste. Aloe vera reduces gingival swelling, soft tissue edema and gingival bleeding in patients with gingivitis due to its

soothing and healing properties. Aloe vera mouthwash when compared to chlorhexidine was an effective antiplaque agent and it had a better taste and shelf life.<sup>[30]</sup> Local drug delivery of aloe vera into periodontal pocket reduced the pocket depth. Subgingival administration of aloe vera gel is an adjunct to scaling and root planning in patients with chronic periodontitis.<sup>[31]</sup> The periodontal condition was improved when aloe vera was applied to tissues in tooth brush-dentifrice abrasion and tooth pick injuries.<sup>[32]</sup>

**Healing of extraction socket:** Glucomannan and giberrelins present in aloe vera stimulates fibroblast to proliferate faster and helps in accelerating wound healing by proliferation of epithelial cells and preventing infection.<sup>[33]</sup> A study conducted by Poor *et al* concluded that incidence of alveolar osteitis was reduced by immediate application of acemannan (aloe vera) gel at extraction site when compared to clindamycin-soaked gelfoam.<sup>[34]</sup>

**Anticariogenic:** Aloe vera gel exhibited strong bactericidal activity against some cariogenic and periodontopathic bacteria. Undiluted Aloe vera gel produced significant growth inhibition of oral bacteria.<sup>[35]</sup> Hence, Aloe vera gel can be used for prevention of dental caries and periodontal diseases by adding it to tooth paste. Aloe vera tooth gel had no added fluoride content but showed equal amount of antimicrobial activity as fluoride.

**Pulp therapy in primary teeth:** Aloe vera as a pulpotomy agent was found to be effective with no evidence of abscess, pain, mobility or swelling on follow up after 30 and 60 days.<sup>[36]</sup> Aloe Vera with sterile water found to have maximum antimicrobial activity when compared with zinc oxide with aloe vera, calcium hydroxide with aloe vera, calcium hydroxide with idoform and vasiline when used as obturating material in primary teeth.<sup>[37]</sup> Zinc oxide with aloe vera as an obturating material showed good clinical and radiographic success.<sup>[38]</sup>

**Aloe vera as mouthwash:** Wound healing and antiinflammatory mechanism of aloe vera prevents radiation-induced mucositis when used as mouthwash.<sup>[39]</sup> It also reduces oral candidiasis in patients undergoing head and neck radiotherapy.<sup>[23]</sup>

#### Contraindications

There are some known cases of allergy to Liliaceae family; they are pregnancy (uterine contractions), breast feeding mothers (gastrointestinal distress), acute inflamed intestinal disease, kidney problems, and heart diseases. In children less than 10 years of age oral intake is contraindicated.<sup>[40]</sup>

#### Side effects

On topical application, the side effects noticed are allergic reaction, redness, burning sensation and rarely

generalized dermatitis.<sup>[41]</sup> Systemic side effects are diarrhea, stomach cramps, dehydration, red urine, lowered potassium levels, hepatitis, and irregular heart beat and electrolyte imbalance.<sup>[41]</sup>

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