

Nature's soothing healer in dentistry

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ABSTRACT:

Aloe vera is known for centuries as a medicinal plant. It's a wonder plant with a lot of health benefits and hence has often been called the 'natural healer'. It is a tropical plant that flourishes in a warm and dry climate and looks like a cactus with fleshy thorny leaves. There are around 400 species of Aloe, but it is the Aloe barbadensis Miller (Aloe vera or "true aloe") plant that has been used most (found mainly in Asia, Africa, and other tropical areas) because of its medicinal uses like moisturizing, anti-inflammatory, antioxidant, anticancer, antibacterial, antiviral and antifungal properties. Aloe vera is gaining popularity in dentistry as it is completely natural and there are no side effects being reported with its use.

KEYWORDS – Aloe vera in Dentistry, Aloe vera in Oral Health Care, Nature's gift Aloe vera for treatment of oral health diseases.

INTRODUCTION:

The name Aloe vera derives from the Arabic word "Alloeh" meaning shining bitter substance, while "vera" in Latin means true. The Greek scientists regarded Aloe vera as the universal remedy.⁽¹⁾ It is a perennial succulent xerophyte, which develops water storage tissue in the leaves to survive in dry areas of low or erratic rainfall. The plant has stiff grey-green lance-shaped leaves containing clear gel in a central mucilaginous pulp. It is among the succulent plants which retain and store water in the stems and leaves. This plant is highly resistant to insect pests and comes under 'Arbuscular plants' which have the fungus Arbuscular Mycorrhiza on the surface. This fungus penetrates inside and helps in the absorption of potassium and other minerals from the soil. Because of this, the plant is of high medicinal value. But like any other plant or fruit which loses its therapeutic value when cut, aloe vera also gets unstable as it gets oxidized when cut.⁽²⁾

Cosmetic and some medicinal products are made from the mucilaginous tissue in the center of the aloe vera leaf and are called aloe vera gel. The peripheral bundle sheath cells of aloe vera produce an intensely bitter, yellow latex, commonly termed aloe juice, sap, or aloe. There are over 250 species of Aloe grown around the world. Only two species are grown commercially: Aloe barbadensis Miller and Aloe arborescens. The Aloe vera plant has been known and used for centuries for its medicinal and skin care properties. Anti-inflammatory, antiviral, antibacterial, and antioxidative effects are proven to be in aloe vera, and its use as a herbal remedy in dental conditions is increasing day by day. In Ayurvedic medicine (the traditional medicine of India), Aloe has multiple uses like a laxative, antihelminthic, hemorrhoid remedy, and uterine stimulant. It is used topically, often in combination with licorice root, to treat eczema or psoriasis. Over the years, this plant has been known by a number of names such as "the wand of heaven", "heaven's blessing," and "the silent healer".^(2,3)

HISTORY:

The Egyptians called it "the plant of immortality". Aloe is commonly used in both traditional Chinese and Ayurvedic medicine. Egyptian queens Nefertiti and Cleopatra used it as part of their regular beauty regimes. Alexander the Great, and Christopher Columbus used it to treat soldiers' wounds. The first reference to Aloe vera in English was a translation by John Goodyew in A.D. 1655 of Dioscorides' Medical treatise De Materia Medica.^(4,5)

METHODOLOGY:

The literature was searched online on the topic of Nature's soothing healer in dentistry. The literature published only in the English language has been selected in this review, Keywords used are aloe vera in dentistry, aloe vera in oral health care, nature's gift aloe vera for treatment of oral health disease. A complete literature search was conducted utilizing electronic databases such as Google scholar, IOSR journal of dental and medical sciences, Hindawi publication etc. on this topic. The articles were selected based on aims & objective of the study. The review data consisted of different original articles, reviews. All articles were read thoroughly & discussed by all the authors, and the data are summarised in this review.

COMPOSITION:

The inner clear gel is 99% water and contains around 75 active ingredients including vitamins, enzymes, sugars, minerals, lignin, saponins, salicylic acid, and amino acids. Various vitamins present in Aloe are Vitamin A (beta carotene), C, and E which have anti-oxidant properties. Also present are vitamin B1, B2, B3, B6, B12, folic acid and choline. Several inorganic ingredients and trace elements are also present like aluminum, boron, barium, calcium, iron, magnesium, sodium, phosphorus, silicon, and

strontium. It also contains enzymes such as acid phosphatase, alkaline phosphatase, amylase, lactic dehydrogenase, and lipase, numerous organic compounds such as aloin, barbaloin, and emodin, and around 28 different monosaccharides and polysaccharides.⁽⁵⁾

ACTIVE INGREDIENTS OF ALOE VERA LEAF PULP AND EXUDATES:⁽³⁾

Class	Compounds
vitamins Enzymes	B1, B2, B6, C, A ($\beta\beta$ -carotene), choline, folic acid, $\alpha\alpha$ -tocopherol Alkaline phosphatase, amylase, carboxypeptidase, catalase, bradykinase, cyclooxygenase, peroxidase, carboxypeptidase, cyclooxygenase, lipase, oxidase, phosphoenolpyruvate carboxylase, superoxide dismutase
Anthraquinones	Aloe emodin, aloetic acid, anthranol, aloin A and B (or collectively known as barbaloin), isobarbaloin, emodin, ester of cinnamic acid
Inorganic compounds Carbohydrates	Calcium, chlorine, chromium, copper, iron, magnesium, manganese, selenium, zinc, potassium, phosphorous, sodium Pure mannan, acetylated mannan, acetylated glucomannan (acemannan), galactan, glucogalactomannan, galactogalacturan, galactoglucoarabinomannan, arabinogalactan, pectic substance, xylan, cellulose
Saccharides	Mannose, glucose, L-rhamnose, aldopentose
Organic compounds and lipids	Arachidonic acid, $\gamma\gamma$ -linolenic acid, steroids (campesterol, cholesterol, $\beta\beta$ -sitosterol), triglycerides, triterpenoid, gibberellin, lignins, potassium sorbate, salicylic acid, uric acid
Chromones	8-C-glucosyl-(2-O-cinnamoyl)-7-O-methylaloeidin A, 8-C-glucosyl-(S)-aloesol, 8-C-glucosyl-7-O-methyl-(S)-aloesol, 8-C-glucosyl-7-O-methylaloeidin, 8-C-glucosyl-noreugenin, isoaloesin D, isorabaichromone
Nonessential and essential amino acids	Alanine, arginine, aspartic acid, glutamic acid, glycine, histidine, hydroxyproline, isoleucine, leucine, lysine, methionine, phenylalanine, proline, threonine, tyrosine, valine

BIOLOGICAL EFFECTS OF ALOE VERA:

- 1) Healing properties: A 1996 study reported that a high molecular weight polypeptide constituent from the gel demonstrated a healing effect on excisional wounds in rats. Glucosylmannan, a mannose-rich polysaccharide and gibberellin, a growth hormone, interacts with growth factor receptors on the fibroblast, thereby stimulating its activity and proliferation, which in turn significantly increases collagen synthesis after topical and oral.^(5,6)
- 2) Protective effects on skin exposed to UV and gamma radiation: Aloe vera gel has been reported to have a protective effect against radiation damage to the skin. On skin exposed to UV and gamma radiation, following the administration of aloe vera gel, an antioxidant protein, metallothionein, is generated in the skin, which scavenges hydroxyl radicals and prevents suppression of superoxide dismutase and glutathione peroxidase in the skin.^(9,10)
- 3) Anti-inflammatory action: Aloe vera inhibits the cyclooxygenase pathway and reduces prostaglandin E2 production from arachidonic acid. Recently, the novel anti-inflammatory compound called C-glucosyl chromone was isolated from gel extracts.^(6,10)
- 4) Effects on the immune system as an immune enhancer: Alprogen inhibit calcium influx into mast cells, thereby inhibiting the antigen-antibody-mediated release of histamine and leukotriene from mast cells.⁽⁹⁾
- 5) Antiviral and antifungal effects: Streptococcus pyogenes and Streptococcus faecalis are two microorganisms that have been inhibited by aloe vera gel. A processed aloe vera gel preparation reportedly inhibited the growth of Candida albicans.^(5,9)
- 6) Moisturizing and anti-aging effect: Aloe gel works by attracting water from the dermis below and by helping to keep this water bound in the stratum corneum. Aloe stimulates fibroblast which produces the collagen and elastin fibers making the skin more elastic and less wrinkled.^(8,10)
- 8) In various systemic conditions like skin disorders like psoriasis, arthritis, asthma, digestive and bowel disorders, diabetes, and lowering lipid levels in hyperlipidemic patients. It can also be used as a detoxifying agent, for topical application of first and second-degree burns, in Alzheimer's disease, and in various cosmetic and medical products.

USES OF ALOE VERA IN VARIOUS BRANCHES OF DENTISTRY:

The dental uses of aloe vera are numerous. There is increased interest among researchers to analyze the use of aloe vera in dentistry and various studies have proved the effectiveness of this plant^(7,8,9,10,11,12,13,17)

It is used in Chronic oral lesions like Lichen planus, pemphigus, Antifungal, Antiviral, Aphthous stomatitis and canker sores, Oral submucous fibrosis, Wound healings, Burning mouth syndrome, Oral recurrent ulceration, Chemical burns from accidents with aspirin, Angular cheilitis. These anti-inflammatory agents typically work by stimulating immune system function and collagen growth, or by blocking pathways that cause irritation.^(7,8)

It is very effective and used in Pulpotomy of primary teeth, Obturation of primary teeth. It promotes new dentin formation by stimulating proliferation, differentiation, extracellular matrix formation and mineralization of primary cells in the human pulp.^(8,9)

Prevention of dry sockets (Alveolar osteitis) by reducing the inflammatory conditions and providing antimicrobial condition.⁽¹⁰⁾

In toothpastes and mouthwashes. it provides soothing effect on gingiva and provide an antimicrobial and antifungal environment.^(11,12)

It has been used in root canal treatment as a sedative dressing and file lubrication during biomechanical preparation. Aloe vera has proved to be a good obturative material for primary teeth. It can be used as Intracanal medicament, Disinfection and a sepsis, Disinfection of irrigation units, Disinfection of gutta percha cones, Bleaching property in tooth paste.^(12,13)

Acemannan, a complex mannose carbohydrate, which is one of the main ingredients of the aloe vera gel was found to have good adhesive properties. It is this property that led to the production of prototype acemannan denture adhesive. The painful areas of the oral mucosa covered by dentures can be treated with aloe vera gel as it is also a good antifungal agent.⁽¹¹⁾

Aloe Vera greatly reduces the instances of gingival bleeding due to its soothing & healing properties, reduces swelling and soft tissue edema. Hence it helps to restore gums to health. Aloe vera mouthwash can be an effective antiplaque agent and with appropriate refinements in taste and shelf life can be an affordable herbal substitute for chlorhexidine. Even used for Bleeding and painful gums, Applications directly to the sites of periodontal surgery along with periodontal dressing or to gum tissues, Pregnancy gingivitis. Aloe vera mouthwash is as effective in reducing periodontal indices as chlorhexidine. Results showed a significant reduction in gingival bleeding and plaque index in both groups over a period of 15 and 30 days^(9,11,17)

CONTRAINDICATIONS:

Aloe vera should be used cautiously in pregnancy, lactating mother, and allergy to the Liliaceae family. Aloe vera actually contains salicylic acid, one of the most well-known ingredients known to be dangerous during pregnancy. Aloe vera contains anthraquinones, a powerful laxative commonly used as a laxative. Pregnant women should avoid taking (in) aloe vera products that may contain anthraquinones.⁽¹⁹⁾

SIDE EFFECTS:

Side effects may be categorized into topical or systemic routes as follows:^(20,21)

A. Topical: It may cause redness, burning, and stinging sensation. Allergic reactions are mostly due to anthraquinones, such as aloin and barbaloin. It is best to apply it to a small area first to test for possible allergic reactions.⁽²⁰⁾

B. Systemic: Abdominal cramps, diarrhea, red urine, hepatitis, dependency or worsening of constipation. Prolonged use has been reported to increase the risk of colorectal cancer. The laxative effect may cause electrolyte imbalances (low potassium levels).⁽²¹⁾

CONCLUSION:

Aloe vera may find a promising role in various branches of dentistry in the future. Proper diagnosis, knowledge of traditional medicine, and implementation of that knowledge into the treatment plan are important in ensuring success with this dental therapeutic agent. Standardization and quality assurance of aloe vera products is a key area that needs to be focused on. Further, controlled studies are also required to prove aloe vera's effectiveness under various conditions. Also, the potential long-term side effects of Aloe vera need to be studied and evaluated.

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