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A REVIEW OF ALOE VERA WITH DIFFERENT APPLICATIONS AND CHARACTERISTICS

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ABSTRACT

The Asphodelaceae family includes Aloe Vera, which is a perennial herb and commonly known as Ghrit Kumari in India. It has been utilized as an antibacterial agent, antioxidant, anti-obesity, anti-diabetic, anti-inflammatory, and anticancer agent since ancient times. It has been discovered in many regions of the world, including the United States, the West Indies, the Bahamas, Mexico, Central America, Arabia, and other countries of Asia and the world in general. It is known by several names in various countries. A range of chemical and bioactive components are attributed for varied properties and making it a therapeutic plant. Aloe Vera is being used as a cosmetic, to prepare aloe Vera juice, and in a range of meals, as well as to make capsules. This review article sheds light on numerous Aloe Vera qualities in comprehensive aspect by evaluating several experiments and publications from other researchers.

KEYWORDS: Aloe Vera, pharmaceutical properties, antioxidant, antimicrobial, medicinal properties.

INTRODUCTION

Aloe Vera is composed from two words “ALLOEH” that is an Arabic word which means “shinning bitter substances” and Latin word “VERA” means true. It has been considered as catholicon by Greek scientists.[1] Aloe Vera is also known as Aloe Barbadensis Miller which is one of the 400 species of Aloe. This plant has a clear pulp that is known as gel which is commonly used for medicinal, cosmetics and neutraceutical appliances.[2]

OTHER NAMES AND SYNONYMOUS

Aloe Vera is considered as "miraculous plant", "the wand of heaven", "heaven's blessing," and "the silent healer" and "wonder plant" are famous name given to Aloe Vera in literatures. In addition to this, there are also other names as below.

- Sanskrit- Ghrit Kumari.
- English: aloe Vera, Curaçao aloe, true aloe, Barbados aloe, West Indian aloe
- Arabic: Subaar, Subair, Elwa;
- Portugese: babosa-medicinal, babosa, erva-babosa
- Swedish: äkta aloe;
- French: aloès vulgaire;
- Spanish: acibar, sávila, aloe
- German: echte Aloe.

This plant is also popularly known as aloe, burn plant, lily of the desert and elephant's gall.[3,5,30]

The **synonymous** of Aloe Vera are Aloe barbadensis Miller, A. Vera L. var. chinensis Berger, Aloe elongata Murray, Aloe officinalis Forsk., Aloe Vera L. var. lit-toralis König ex Bak., Aloe rubescens DC, Aloe perfoliata L. Aloe indica Royle , Aloe chinensis Bak., Aloe vulgaris Lam.

It is considered by various books that Aloe babadensis Miller is the right name. Whereas the International Rules of Botanical Nomenclature (IRBN) accept Aloe Vera (L.) Burm. f. to be a scientific name.[3, 4]

Botanical Characteristics and Occurrence

Singh was reported that this magical plant is also found in USA, West indices, Bahamas Mexico, Central America, Arabia and some other parts of Asia. It has been used by Egyptian, Indian, Chinese, Romans, and Greeks as a medicinal purpose. In 1753, first time Carl Linnaeus explained about Aloe Vera and gives us following classification.

KINGDOM	PLANTAE
ORDER	ASPARGALES
FAMILY	ASPHORDELACEAE
GENUS	ALOE
SPECIES	ALOE VERA

It is perennial plant. It grows to 60-100 cm long with thick and fleshy leaves or sword shape leaf. Additionally, yellow bitter latex and viscous gel are kinds of liquid found in Aloe Vera leaves. It also bloom flower in summer.[6]

Chemical Constituents

Aloe Vera plant make up from 99% to 99.5% water, while 0.5%-1.0% solid material which is mainly contain above 200 bioactive compounds, such as sugars, anthraquinones or phenolic compounds, lignins, saponins, steriols, amino acids and salicyclic acis.[7,8] Moreover, Vitamins C, A, E, B, B-carotene, Zinc, Calcium, Copper, Magnesium, Manganese, and Phosphorous, Five distinct enzymes, 20 Amino Acids were also found in this plant.

Antraquinones and tricyclic aromatic quinine are two major bioactive components in plant.[2]

Properties and Uses of Aloe Vera

1. Antioxidants properties

The overproduction of free radicals in the presence of oxygen caused by homolytic cleavage of covalent bonds, disrupting the equilibrium balance between reactive oxygen species and antioxidant system, which seems to be the primary cause of multiple degenerative diseases. A variety of diseases are arising as a result of patho-physiology transformations induced by the development of lipid peroxides as there is an oxidative drop of polyunsaturated fatty acids. Antioxidants counteract oxidative stress by removing electrons, which are then added to free radicals, allowing them to self-oxidize and protect themselves from oxidative damage. Aloe Vera gel contains a range of anti-oxidant compounds, including superoxide dismutase (SOD), vitamin E, glutathione peroxidase (GPx), carotenoids, flavonoids, vitamin C and phenolic antioxidants, as well as other phytochemicals with anti-oxidant properties.[9] Some Aloe Vera species have anti-oxidant activity, such as A. arborescens, A. melanacantha, Aloe greatheadii var. Davyana, A. saponaria, A. harlana, A. marlothii, and A. ferox. Aloe Vera had the highest anti-oxidant property of all of the 15 leaf extracts studied. A. ferox demonstrates the greatest antioxidant efficacy. Ferric Reducing Antioxidant Power (FRAP) and Oxygen Radical Absorbance Ability (ORAC) Analyses are two methods for investigating anti-oxidant properties. FRAP determines a mixture's or compound's ability to reduce ferric ions, while ORAC evaluates its ability to scavenge free radical.[10]

2. Anti-obesity effects

Obesity is caused by an imbalance between the energy provided by food from a meal and the energy used by a person's body. As stated by WHO (World Health Organization) and NIH (National Institutes of Health), the person whose Body Mass Index (BMI) is more than 30kg/m2 is categorized as obese. Obesity is a condition in which a person's weight exceeds normal limits, and it is a phenomenon that affects people all over the world. Obesity leads to number of other diseases of metabolic disorders like insulin resistance, type II diabetes, retinopathy, neuropathy, nephropathy and cardiopathy. Aloe Vera has been found to have a beneficial effect in several trials.[10] In rats, doses of dried Aloe Vera gel powder resulted in a decrease in body weight, visceral fat weight, body fat, and serum lipids. Another research found that Aloe Vera phytosterols 5 doses reduced visceral fat and fasting and spontaneous blood glucose levels in Zucker Diabetic Fatty (ZDF) rats.[11]

3. Anti-diabetic effect

It has been confirmed that Aloe Vera gel is safe for anti-hyperglycemic patients and anti-Hypercholesterol. In vivo and in vitro conditions certain water-soluble species of Aloe Vera have glucose reducing properties and other agents which are used to induce the formation of glucose transporters – 4 mRNA expression. Aloe Vera gel is found to help weight loss of body weight, fatty body mass and insulin resistance in tentative unhealthy victims. The compound that is contained in Aloe Vera gel i.e. aloe-emodin-8-O-glucoside is another analysis which has found that the digestion and conversion of glucose by proximal and distal markers for glucose is controlled to glycogen. Phytosteroles found in Aloe Vera can also cure diabetes. Aloe Vera can help diabetics with carbohydrate metabolism and metabolic imbalance by lowering their body weight, body fat mass, fasting blood glucose, and fasting serum insulin. Aloe Vera has been shown in studies to improve the function of rat pancreatic islets cells, mitochondrial production, insulin levels, and the reduction of reactive oxygen species.[3]

4. Anti-inflammatory activity

Aloe Vera has been shown to increase healing process in diabetic mice due to the existence of glycoprotein and polysaccharides that have anti-inflammatory and anti-oxidant properties.[12] Presence of Acemannan sugar present in the Aloe Vera helps to regenerate periodontium tissues and also reduces the harm which is related with inflammatory disease like periodontitis.[13] It has been found out that in mice having acetaminophen-induced hepatitis

the anti-inflammatory effect is reported which showed decrease hepatic MDA (Malondialdehyde), IL-12, and IL-18 levels and ALT (alanine transaminase) and high GSH (Glutathione) content after giving doses of Aloe Vera of amount 150mg/kg. The cytokines, ROS production and JAK1-STAT1/3 signaling pathway can be hindered by the presence of aloin that has a property of anti-inflammatory present in Aloe Vera.[14] Aloe Vera have wound healing properties proved by using different technology like differential scanning caloriometry(DSC), thermogravimetry analysis (TGA), Fourio – Transform Infrared spectroscopy(FT-IR) and Scanning electron microscope.[15]

5. Anti-cancer activity

The existence of aloin and aloe-emodin has shown the ability to cure cancer by decreasing the proliferation of Ehrlich ascites carcinoma cells. Tumor such as lung carcinoma, hepatoma and leukemia cell lines can be treated with help of components present in Aloe Vera. It is studied that the aloe-emodin leads to the manifestation of anticancer activities, transcription activators and blocking of signal transducers, hence blocks the enlargement of tumor blood vessels. It also stimulates p53 and p21 expression that lead to cell apoptosis which is seen in hepatocellular carcinoma cells in cellular apoptosis and breast cancer cell proliferation can be conquered by the transcription of estrogen receptor α protein and also decreases the level of estrogen receptor α levels.[16]

6. Antibacterial property

An antibacterial effect of aloe Vera and calcium hydroxide was compared to 20 different samples of *E. faecalis* biofilm. It has great antibacterial effects, indicating that it is a valuable source that can be used as an intracanal medicament.[17] Another study done on two microorganisms isolated from intestinal tract of Guniea Fowls. It has been that aloe Vera have had inhibitory zone against Escherichia coli and Salmonella enteric.[18] The internal gel of Aloe has two anthraquinones *Aloe*-emodin and chrysophanol which prevents the growth of H. Pylori strains.[19] A study was carried out in the Indian state of Chhattisgarh to see how aloe Vera gel affected oral organisms. It was concluded that 50% and 100% concentrate gel had inhibitory effects against several Gram Positive and Gram negative bacteria, including *A. actinomycetemcomitans, S. mutans Clostridium bacilli* and *Staph. Aureus.*[20]

7. Antiviral effects

The study found that 0.2-5 percent aloe Vera gel had a strong inhibitory effect on HSV-1 growth in Vero cells. This gel can also be an important topical therapy for orally HSV-1

infections, and does not have any toxicity.[21] In vivo and in vitro, polysaccharides isolated from A. Vera expressed strong anti-influenza virus effects. To avoid virus particle adsorption, APS would interfere direct with PR8 (H1N1) influenza virus particles. Previous research has also shown that APS might help to enhance the function of immune system, which is considering other mechanism of antiviral infection.[22] According to a review of the literature, the plant has antiviral activity against several types of viruses (Haemorrhagic Viral, Herpes simplex virus type 1, Rhobdavirus Septicaemia, Herpes simplex virus type 2, Varicella-Zoster virus, Influenza virus, poliovirus, human immunodeficiency virus, Cytomegalovirus, Human papillomavirus), including the Coronavirus SARS-CoV -1. Whereas further clinical trial is need to perform against Coronavirus.[23]

8. Antifungal effects

Nowadays several pathogenic fungus cause various disease. Therefore aloe Vera gel tested against some fugal species and it showed significant inhibitory effects with 5mm to11mm inhibition zone. As it was found that aloe Vera gel have 18 bioactive compounds including phenol, Saponins, sterols, flavonoids, alkaloids, cardiac glycosides and terpenoids.[24] It also showed inhibition zone of 17.225±0.512 mm against *Candida albicans* with 50 percent concentration.[25]

9. Anti parasitic effects

It is clear from the findings that A. Vera ethanol and metanolic extracts showed antiparasitic activity against Acan-thamoeba species cysts[26] and Toxoplasma gondii[27], respectively.

10. Other uses of Aloe Vera

Aloe Vera plant used for several other purposes that are mentioned below.

- SKIN PROTECTION AND COSMETIC PRODUCTS: It has been there for treating acne since ancient times, but it was finally noticed to be skin-protective, which is why it is used like a moisturizer for sensitive skin and a skin problems treatments.[16] This plant gel and sugar are employed in a wide range of skin care items against pimples, flaky scalp, and are dermatological important in beauty production units. It's applied as moisturizer, skin tonics, sunscreen lotions, and a variety of other goods.[29]
- ALLEVIATES CONSTIPATION: Aloe Vera latex which has a compound called aloin or barbaloin (has laxative Effects) which help to treat constipation in humans.[28]

- TREATS BURNS: It is claimed to help with pain, discomfort, and the onset of allergic symptoms.[28]
- BOOSTS GASTROINTESTINAL FUNCTION: Consumption of Aloe Vera has also been shown to inhibit the growth of H.pylori bacteria, which causes ulcers, due to its anti-inflammatory effects.[14]
- HELPS TO IMPROVE ORAL HYGIENE: According to a recent study, Aloe Vera toothpaste and mouthwash are suggested to improve oral hygiene (teeth) and minimize dental caries.[14]

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