



## A Review on Aloe Vera Gel

*Mr. Abhishek Shivraj Gambhire<sup>1</sup>, Miss Bawage S.<sup>2</sup>, Dr. Nitin Lonikar<sup>3</sup>*

<sup>1</sup>B. Pharm Final Year Student, Latur College of Pharmacy, Hasegaon.

<sup>2,3</sup>Latur College of Pharmacy, Hasegaon.

### ABSTRACT:-

Used in Ayurvedic, Homoeopathic, and Allopathic medicine, aloe vera is a succulent plant with medicinal characteristics that grows in dry and subtropical areas. Numerous studies have demonstrated the anti-inflammatory properties of aloe vera's bioactive components, which also support lipid, carbohydrate, and metabolic processes, assisting in the maintenance of normal blood sugar and cholesterol levels as well as normal body weight. Aloe vera enhances the skin's ability to regenerate when applied externally.

Keywords: Antioxidants found naturally bioactive elements. anti-oxidant function. Aloe vera.

### INTRODUCTION:-

A significant place in the pharmaceutical industry is held by medicinal plants because of their abundance of bioactive chemicals. The vast majority of recently approved antibiotics come from natural sources<sup>1</sup>. WHO<sup>2</sup> states that the greatest source of a wide range of medications would be medicinal plants. Antioxidants are chemicals that stop other compounds from oxidizing. Since food products are susceptible to this kind of chemical change, using antioxidants has become essential to preventing food degradation from oxidation. For millennia, people have utilized and appreciated the benefits of aloe vera for its medical, cosmetic, and skin-care qualities. Aloe vera is a highly useful and significant herbal plant that has numerous medical uses as well as pharmacological benefits for people. and faunal. Aloe vera is also utilized medicinally in a variety of cultural systems. The skin of mammals acts as a physical barrier to prevent microbial invasion, mechanical harm, and chemical insults (Plotczyk, Higgins, 2019). In a process known as wound healing, the loss of skin integrity necessitates quick and effective modifications of the torn tissue to preserve body homeostasis (Rittié, 2016; Sorg et al., 2017).

### HISTORY:-

The aloe vera plant has been utilized for millennia and is highly regarded for its medicinal, skin-care, and wellness benefits. The Arabic term "Alloeh," which means "shining bitter substance," and the Latin word "vera," which means "true," are the sources of the name Aloe vera. Greek scientists believed that aloe vera was the only plant that could cure all ailments 2,000 years ago. Aloe vera, frequently called a "miraculous" plant, has been used by humans for generations to heal a variety of ailments, including renal illness, hair loss, stomach issues, constipation, and more (Park & Lee, 2006). Aloe's ecological characteristics indicate that it originated in Africa, and its use has been documented for about 6000 years (Table 1).

### Taxonomy:-

**Kingdom:-** Plantae

**Order:-** Asparagales

**Division:-** Spermatophyte

**Subdivision:-** Angiospermae

Anytime during the year when the temperature rises sufficiently to encourage new attachment

**Class:-** Monocotyledoneae

**Genus:-** Aloe

**Species:-** Barbadosensis Mill[24]

**Synonyms:-** Aloe, Musabbar, Kumari

**Biological source:-** Aloe vera is made up of the fresh juice that is extracted through incision from the bases of various aloe species' leaves. Aloe perryi, also known as Aloe ferox and Aloe Barbadosensis Mil.

**Family:-** The Liliaceae is the family to which it belongs.

---

### Microscopical Overview:-

The plant has a common appearance and is 30–60 cm high with a small, thick, somewhat isolated stem. The leaves are opaque green, stalkless, lanceolate, erect, spreading outward rather than inward, and have sharp teeth at the edges. They are about 30–60 cm long, 10 cm wide, and 1.8 cm thick with juice. The flower stalk is extended and layered, lasting longer than the leaves.

#### *Aloe vera plant parts:-*

The two distinct parts of the Aloe barbadensis plant yield substances with entirely different compositions and medicinal qualities, as reported in the Journal of Dental Surgery. The clear, thin, tasteless, jelly-like substance known as aloe vera gel (or mucin) is produced by the parenchymal tissue, which comprises the inner part of the aloe leaves. From which this tissue is recovered. the leaf by removing the gel's inner cellular waste. The remaining portion of the plant consists of a collection of specialized cells called pericyclic tubules, which are located directly below the leaf's outer green ring.

#### *Aloe vera's active ingredient is:-*

The inner gel contains over 75 identified active ingredients, which include vitamins, minerals, enzymes, sugars, phenolic compounds, anthraquinones, lignin, saponins, sterols, amino acids, and salicylic acid. Aloe vera leaf pulp and exudates' active components.

---

### Planting and Gathering:-

Over 250 species of mature aloe are known to exist worldwide. Nevertheless, only two species are currently grown commercially: the most common ones are Aloe barbadensis Miller and Aloe aborescens. Aloe vera is a plant that grows best in warm tropical climates; it cannot withstand freezing temperatures. It is an evergreen perennial that slowly grows to 0.8 m by 1 m in size. The plants lean toward medium (loamy) and light (sandy) soil. needs depleted soil on all sides in order to grow in genuinely poor soil. The plant prefers acidic, impartial, and fundamental (basic) soil. It cannot grow in shadows. It can withstand dry spells and needs clammy or dry soil. These plants are xerophytic. It can spread through seeds. In the spring, seeds are sown in a warm green house. At 16°C, the seed typically sprouts in 1–6 months. The seedlings are transferred to pots with significantly depleted soil. For at least their first two winters, they are allowed to grow in the sunny areas. The Counterbalance will be available in the spring, for the most part. The plants can be isolated and produce balance without inhibition. development and allow for plant restoration.

#### **Ingredients that are active in aloe vera leaf and exudates:-**

- Enzymes: alkaline phosphatase, amylase, carboxypeptidase, catalase, bradykinase, cyclooxygenase, peroxidase, carboxypeptidase, cyclooxygenase, lipase, oxidase, phosphoenolpyruvate, carboxylase, superoxide dismutase;
- Vitamins: B1, B2, B6, C, A (N $\beta$ -carotene), choline, folic acid,  $\alpha\alpha$ -tocopherol
- Anthraquinones include: isobarbaloin, emodin, ester of cinnamic acid, aloe emodin, aloetic acid, anthranol, aloin A and B (or barbaloin in general).
- Inorganic compounds:- sodium, potassium, phosphorous, iron, magnesium, manganese, selenium, zinc, calcium, chlorine, chromium, copper, and iron
- Sugars and Carbs: acetylated glucomannan (acemannan), acetylated mannan, and pure mannan galactan, galactoglucoarabinomannan, galactogalacturan, and galactogalacturan xylan, cellulose, pectic substance, and arabinogalactan
- Saccharides:- aldopentose, glucose, mannose, and L-rhamnose.
- Organic compounds and fats:-  
arachidonic acid, linolenic acid, triglycerides, triterpenoid, gibberellin, lignins, potassium sorbate, salicylic acid, and uric acid. Steroids: cholesterol, campesterol, and sitosterol.
- Chromosomes:-  
2-O-cinnamoyl-(8-C-glucosyl)seven-O-methylaloeidin A, eight-C-glucosyl-(S)-aloesol, eight-C-glucosyl-7-O-methyl-(S)-aloesol, eight-C-glucosyl-noreugenin, eight-C-glucosyl-isoaloesin D, and eight-C-glucosyl-7-O-methylaloeidin
- The amino acids leucine, lysine, methionine, phenylalanine, proline, threonine, tyrosine, valine, aspartic acid, glutamic acid, glycine, histidine, hydroxyproline, isoleucine, and arginine are the non-essential and essential amino acids. The Physiological and Medicinal Effects.

---

## **Aloe vera Gel:-**

Numerous studies have tried to connect the chemical components of the gel to particular biological effects.

### **1. Effects of Healing Wounds:-**

Aloe gel's ability to heal wounds has been explained by a variety of mechanisms, including maintaining the wound's moisture content and boosting epithelial cell growth. Migration, accelerated collagen maturation, and decreased inflammatory response [6]. A High molecular weight polypeptide component from the Gel was shown in a 1996 study to have a healing effect on rats' excisional wounds [13]. Gibberellin, a growth hormone, and the mannose-rich polysaccharide glucomannan interact. after topical and oral application, increasing collagen synthesis by activating the fibroblast's growth factor receptor, which in turn stimulates the fibroblast's proliferation and activity [7].

### **2. Antioxidant Activity-**

: Studies in the literature have documented the in vitro antioxidant activity of leaf extracts from *A. arborescens* [27], *A. ferox* [28–30], *Aloe greatheadii* var. *Davyana* [31], *A. harlana* [32], *A. saponaria* [33], *A. marlothii*, and *A. melanacantha* [34]. Leaf extracts were reported by Sazhina et al. [35].

### **3. The third effect was skin hydration:-**

It was suggested that the higher concentrations of Aloe vera Gel (0.25% and 0.5% w/w) enhanced skin hydration, possibly through a humectant mechanism. The aloe gel's humectant mechanism explains how it draws water from the dermis below and keeps it trapped in the stratum corneum.

### **4. Inhibition of Inflammation:-**

Bradykinase body movements have been used in a variety of in vitro and in vivo studies to uncover the anti-inflammatory activity of aloe vera gel. Bradykinin is an inflammatory chemical that causes pain. Bradykinase, a peptidase that breaks down this substance, was isolated from aloe and demonstrated to function.

### **5. Antiviral Property:-**

Both direct and indirect action are possible. both direct from immune system stimulation and indirect in light of aloe emodin [21]. Aloe vera contains an ingredient called aloe emodin, which prevents some viruses from growing. According to Thomson's research [22], aloe vera is therefore virucidal against influenza, varicella zoster virus, pseudorabies virus, and Herpes simplex virus types 1 and 2. In the course of. During the course of these investigations, it was discovered that the anthraquinones extracted from the inner leaf of aloe and the roots, bark, or leaves of several other plants containing anthraquinones were responsible for the virucidal activity.

### **6. Anti-Tumor Activity:-**

Aloe vera contains a variety of glycoproteins. The purpose of the antiulcer and countertumor effects is to promote the growth of normal human dermal cells.[47]Recent research suggests that a polysaccharide division suppresses the authoritative of benzopyrene to vital rodent hepatocytes, maintaining the structure of potentially disease-causing benzopyrene-DNA adducts. In addition, it has been demonstrated that phorbol myristic acidic corrosive reduction inhibits the tumor-promising effects of glutathione transferase and may present advantageous conditions for the application of aloe gel as a cancer treatment.[47].

### **7. Immunomodulating Effects:-**

The polysaccharide acemannan, which is found in aloe vera, which is a great immune stimulant, contains 90% trace minerals, iridium and rhodium. This significantly raises the number of white blood cells. or both T cells and macrophages. Consequently, immune-modulating effects arise from macrophage cell activation to release cytokines (such as tumor necrosis factor, interleukin-1, interleukin-6, and interferon- $\gamma$ ) and exhibit markers on the cell surface [23, 24]. It contributes to a 40% increase in thymus gland size. The immune system's T cells are made in the thymus.



### **8-Anti-Diabetic:-**

In type 2 diabetic mice, the five phytosterols—aloe vera, lophenol, 24-methyl-lophenol, 24-ethyl-lophenol, cycloartanol, and 24-methylenecycloartanol—proved to be resistant to the effects of diabetes. Polysaccharides found in aloe vera increase insulin levels and have hypoglycemic properties.

### **9. Laxative Effect:-**

Anthraquinones promote intestinal peristalsis, raise intestinal water content, and stimulate water secretion [28]. Additionally, as was previously indicated, an exudate is produced by a collection of specialized cells called pericyclic tubules, which are located just beneath the leaf's outer green ring. This is made up of a strong laxative-like action and a bitter yellow latex [4].

---

### **Side effects:-**

#### **1.Topical:-**

One of the possible side effects is topical, where sensitive people may experience burning, stinging, redness, and in rare cases, generalized dermatitis. Most allergic reactions are caused by anthraquinones, which include barbaloin and aloin. To check for a potential allergic reaction, it is best to apply it to a small area first.

#### **2. Oral:-**

*Constipation* getting worse, diarrhea, red urine, hepatitis, and abdominal cramps. It has been noted that prolonged use raises the risk of colorectal cancer. Low potassium levels can result in electrolyte imbalances due to the laxative effect.

#### **3. Contraindication:-**

Avoid in situations where a documented allergy exists to plants belonging to the Liliaceae family.

#### **4. Pregnancy and breastfeeding:-**

Because oral aloe theoretically stimulates uterine contractions, it is not advised during pregnancy. Additionally, for nursing moms, it occasionally causes gastrointestinal distress in the nursing child.

#### **5. Interactions:-**

Steroid creams like hydrocortisone may be more readily absorbed when aloe vera is applied topically. Because it lowers potassium, it decreases the effectiveness of digoxin and may exacerbate its negative effects. The risk of potassium depletion may increase if aloe vera and furosemide are used together. Because it lowers blood sugar, it may interact with insulin and oral hypoglycemic medications. As a result, even though aloe vera has a wide range of benefits and applications, some may just be folklore and some may actually be magic. Controlled trials will eventually be needed to demonstrate aloe vera's efficacy in a range of situations.



**Fig:- Aloe vera plant**

---

## **CLINICAL USES:-**

### **1.aphthous ulcers:-**

According to reports, acemannan hydrogel decreases and speeds up the healing of aphthous ulcers. the suffering brought on by them [29]. Researchers evaluated a gel comprising aloe vera, allantoin, and The effects of silicon dioxide on oral cavity aphthous ulcers[30]. Every patient kept a daily journal to Record the quantity and length of aphthous ulcers, the time between ulcers, the size of the ulcers, and the ulcers themselves. pain during a four-to six-month period. The shorter lesions' duration in one study arm and the greater distance between lesions in the other study arm were both statistically significant. The Gel did not consistently show any improvement in oral ulcers.

### **2. Uses supported by scientific evidence:-**

These applications have been studied on both people and animals. Not all cases of safety and effectiveness have been demonstrated. Conditions include pressure ulcers, mucositis, radiation dermatitis, acne vulgaris, lichen planus, frostbite, aphthous stomatitis, seborrheic dermatitis, psoriasis vulgaris, genital herpes, skin burns, diabete (type 2), HIV infection, cancer prevention, and ulcerative colitis wound healing (results of aloe on wound healing are mixed, with some studies reporting positive results and others showing no benefit or potential worsening).

### **3. Lichen Planus Oral:-**

Numerous researchers have measured the effectiveness of aloe vera in treating oral lichen planus. Aloe vera therapy was administered to a patient in a study who had systemic involvement and lichen planus. The patient was treated topically with aloe vera lip balm and aloe cream for sore hands, as well as by consuming 2.0 ounces of stabilized aloe vera juice every day for three months. While the systemic lesions took longer to clear up, the oral lesions did so in 4 weeks [31]. In a different study, two groups of forty-six OLP patients were randomly assigned. Aloe vera mouthwash and triamcinolone acetonide 0.1% (TA) were administered to each group, respectively. Each group received treatment for four weeks. Individuals underwent assessments on days 8 and 16 and Mouthwash works well as a TA substitute when treating OLP [32]. In a second double-blind study, sixty-four OLP patients were split into two groups and given a daily dose of 0.4 mL (70% Concentration) of either aloe vera (32 patients) or a placebo (32 patients). After six and twelve weeks, the patients underwent evaluations. After six weeks and twelve weeks, respectively, 31.2% and 61% of the cases in the aloe vera group experienced total pain remission. These percentages were 17.2% and 41.6%, respectively, in the placebo group. Aloe Vera was found to enhance patients' overall quality of life score when they have OLP [33].

### **4. Gingivitis:-**

Aloe vera has been the subject of numerous studies to determine its effectiveness in treating gingivitis. A total of 120 participants in a double-blind study were asked to refrain from practicing oral hygiene (brushing their teeth) for 14 days. After that, the participants were split into three groups at random: group C, the positive control group, received 0.2% chlorhexidine; group B, the negative control group, received distilled water as a placebo; and group A, the test group, received 100% aloe vera. At baseline (0), the plaque index (PI) was used to measure plaque accumulation, the modified gingival index (MGI) was used to measure gingivitis, and the bleeding index (BI) was used to measure bleeding. Day 14 and Day 22. Aloe vera toothpaste significantly

reduced plaque and gingivitis, but the effect was not as strong as it was with chlorhexidine. The study concluded that aloe vera mouthwash can be a cost-effective herbal alternative to chlorhexidine and an effective antiplaque agent with the right taste and shelf life adjustments [34].

---

## **MEDICINAL USES/THERAPEUTIC USES:-**

### **1: Anti-Diabetic:-**

In type 2 diabetic mice, the five phytosterols—aloe vera, lophenol, 24-methyl-lophenol, 24-ethyl-lophenol, cycloartanol, and 24-methylenecycloartanol—showed resistance to the effects of diabetes. Polysaccharides found in aloe vera increase insulin levels and have hypoglycemic properties.

### **2. Anti-inflammatory action:-**

Anti-inflammatory action comes from blocking cyclooxygenase pathways. minimizes the conversion of arachidonic acid into prostaglandin E2. Recently, aloe gel extracts were also used to isolate C-glucosyl chromone, a novel anti-inflammatory compound<sup>17</sup>. Aloe vera gel's anti-inflammatory properties were documented by Langmead et al. (18) in human colorectal mucosa in vitro. Aloe vera gel's anti-inflammatory properties (97.5%) in the ultraviolet erythema test were reported by Reuter et al. (19). Aloe vera adventitious root extracts were shown to have anti-inflammatory properties by Lee et al. (20) through the alteration of primary and secondary metabolites via salicylic acid elicitation.

### **3. Antiseptic:-**

The close proximity of six clean experts—lupeol, salicylic destructive, urea nitrogen, cinnamonic destructive, phenols, and sulfur—is what gives aloe vera its sterile properties. These mixtures have the ability to inhibit diseases, parasites, and organisms. Even though many of these applications are fascinating, controlled trials are essential to determine whether a treatment is useful for any illness.

### **4. Anticancer action:-**

Benzopyrene's binding to primary rat hepatocytes is inhibited by the polysaccharide fraction of aloe, which may prevent the formation of a potentially cancer-initiating benzopyrene-DNA adduct. Another study found that phorbol myristic acetate's carcinogenic effects were inhibited and glutathione S-transferase was increased, which may indicate a potential use for aloe gel in cancer chemotherapy<sup>30,31</sup>. Aloe vera has been shown to have anti-tumor activity against DMBA/croton oil-induced skin papillomagenesis in Swiss albino mice, according to Saini et al. <sup>32</sup>. El-Shemy et al.<sup>33</sup> reported that aloe vera leaf active principles isolated by supercritical carbon dioxide extraction had antitumor properties and modulated the activity of antioxidant enzymes.

### **5: Chronotropic Activity:-**

The heart rate is regulated through chronotropic (heart rate) impacts, resulting in a longer diastolic period (the interval between actual solid compressions, or systolic period). The heart chambers fill with blood during the diastolic phase in order to get ready for the next beat. Nevertheless, this is the period of time when the heart relaxes and receives its own nourishment, which is usually very important. If the diastolic cardiovascular support time frame is too short, and the heart rate is too rapid. The heart becomes less efficient at pumping and circulating blood as a result.<sup>[54]</sup>

### **6: Antibacterial and Antifungal Activities:-**

Aloe vera extracts were shown to possess antibacterial and antifungal properties.

### **7. Implications of UV and gamma radiation on skin:-**

Studies have shown that aloe vera gel protects the skin from radiation damage.<sup>46,15</sup>. The precise function of aloe vera gel is unknown, however after it is administered, the skin produces metallothionein, an antioxidant protein that scavenges free radicals.

### **8: Antioxidant Function:-**

The purpose of this study was to measure the effect of aloe vera fluid concentrate on oxidative damage and the expression of Anion Exchanger 1 (AE1, also known as Band 3) in human erythrocytes that had been exposed to the water-soluble free radical initiator 2,2'-azobis-2-amidinopropane dihydrochloride (AAPH). Furthermore, the addition of phenolic blends in the concentrates was found to correspond with different malignancies and catechins. For example, BHA and ascorbic corrosive counteractive action operator activities were distinct from regular and constructed standard cell fortifications. Since glutathione (GSH), a cytosolic agent that prevents cancer, was not utilized by Aloe Vera when it was immediately hatched with GSH in naturally circulated air, This illustrates that Aloe vera extract does not continue auto-extricate through fluid arrangement. oxidation under these test circumstances.

### **9:-Anti-fungal Activity :-**

A refined aloe vera gel preparation reported suppressed the growth of fungus *abbcians*. The purified aloe proteins Has been found to exhibit potent antifungal activity against *candida paraprilsis*, *candida krusei* and *candida Albicans*.

### **10. Moisturizing and anti-aging effect:-**

Aloe contains a lot of mucopolysaccharides, which aid in keeping the skin hydrated. Aloe vera encourages fibroblasts to create collagen and elastin fibers, which improves skin elasticity and reduces wrinkles. Additionally, it softens the skin by coaxing the superficial flaking epidermal cells to stick together.

Aloe gel's amino acids help to soften hardened skin cells as well. The zinc in the gel tightens the pores and has an astringent effect. Hands with gel aloe vera enhanced skin integrity and reduced erythema and fine wrinkles in the treatment of dry skin linked to occupational exposure, suggesting its moisturizing properties 4. The gel also works to prevent acne.

#### **11:-Antimicrobial Properties:-**

Acemannan prevented *Pseudomonas aeruginosa* from adhering to human lung epithelial cells in a monolayer society, and aloe vera gel exhibited bactericidal effects against the microorganism. The advancement of *Candida albicans* development was ruined by improper aloe vera gel preparation. The remaining 0.7% of the gel is composed of solids with starches that make up sweeping portions. The gel contains 99.3% water. Aloe leaf concentrates are used as a diuretic and as a treatment for hemorrhoids. Aloe gel can strengthen the body's defenses against. structure It has been demonstrated that acemannan and glucomannan stimulate macrophages, strengthen safe structures, and have antiviral and antibacterial properties. The preliminary phytochemistry showed that tannins, flavonoids, and terpenoids are closely related. Aloe *secundiflora* may be a rich source of antimicrobial agents, and the people in the Victoria district of Kenya who live nearby may use it.

#### **References:-**

\*DIVYA PATHAK, RAJESH SHARMA 1Assistant Professor, Teerthanker Mahaveer College of Pharmacy, Teerthanker Mahaveer College of Pharmacy, TMU, Moradabad, Uttar Pradesh, India.

2: Krishna University's Suseela Lanka Department of Biotechnology, Machilipatnam-521001, Andhra Pradesh, India.

3: Wojska Polskiego 31, 60-624 Poznań, Poland; Faculty of Food Science and Nutrition, Poznań University of Life Sciences.

4: Resham Vasani, D G Saple, and Amar Surjushe from the Sir J J Group of Hospitals and Grant Medical College's Department of Dermatology, Venereology, and Leprosy, Mumbai, 400 008 Maharashtra, India.

5. -Nuriye Akev\*1, Ayşe Can1, Nurhayat Sütülpınar2, Eda Çandöken1, Nurten Özsoy1, Tuğba Yılmaz Özden1, Refiye Yanardağ3, Erdal Üzen41 Department of Biochemistry, Faculty of Pharmacy, Istanbul University, Istanbul, Turkey 5.

6:-Department of Prosthodontics, Specialist Dental Center, King Abdul Aziz Super Speciality Hospital Compound, Ministry / Arbaz Sajjad1 and Samia Subhani Sajjad21 of Health, Sakaka-42421, Saudi Arabia, Al-Jouf. Section of Biology, College of Science, Jouf University, Sakaka, Al-Jouf, Saudi Arabia;

7:-Diaa MassoudiD 1\*,2, Barakat M. Alrashdi1, Maged M. A. Fouda1,3, Attalla El-kott4,5, Soha A. Solman6, Hanan H. Abd-Elhafeez71.