

# Review of Medicinal and Pharmacological Information of Aloe vera

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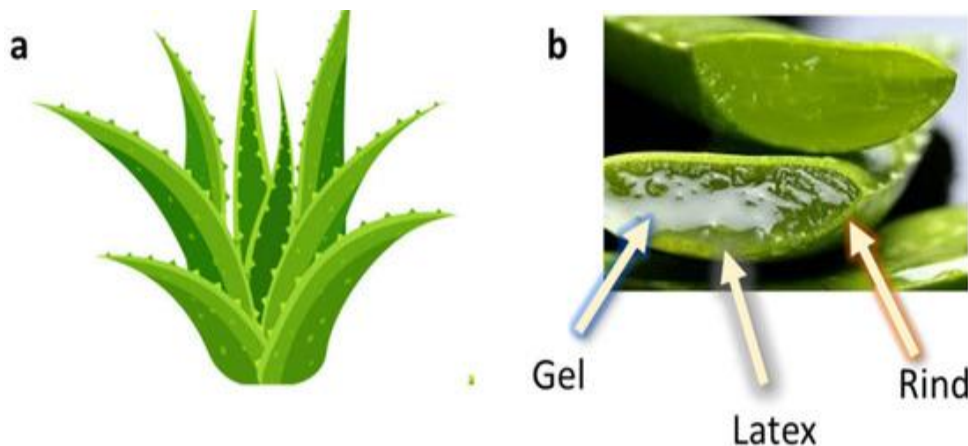
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**Abstract:** *Aloe Vera, a naturally occurring substance, is currently experiencing widespread and frequent application within the domain of cosmetology. Scientific studies have repeatedly proven that Aloe Vera has many different biological activities, such as combating viruses, microbes, tumors, and fungi. Furthermore, a rising area of research is investigating the plant's significant antidepressant effects, which appear relevant to the treatment of numerous conditions, including skin diseases (like psoriasis and acne) and prediabetes.*

**Keywords:** Aloe Vera (AV), Biological activities, Antiviral, Antimicrobial, Antitumor, Antifungal, Antidepressant activity, Skin disorders (psoriasis, acne), Prediabetes.

## I. INTRODUCTION

Name aloe originates to Greek word "alloeh," which translates to "a shining bitter substance. Aloe Vera L. (Another common designation is Aloe barbadensis Miller & Aloe barbadensis mill.) is a fascinating plant with various biological properties, categorized under the genus Aloe. Although it was formerly placed within the large Liliaceae family, the botanist Reynolds reclassified it into the Aloaceae family in 1982. The biological actions of the plant are attributed to its many active compounds, but these effects are probably best explained by the synergistic interaction of the compounds rather than their individual contributions. Aloe is a long-established global herbal remedy recognized for its diverse health benefits. While there are more than 400 species, the primary and most popular one is Aloe barbadensis Miller, is generally referred to Aloe Vera. The plant's name reflects its properties: Aloe comes from the Arabic for "bitter and shiny substance," and Vera is Latin for "truth. Species like Aloe arborescence Miller and Aloe ferox, are also notable health medicine. Internationally, the distribution of Aloe is broad, extending across continents and regions such as Africa, Australia, South and Central America, the Caribbean, India, Mexico, and the Pacific Rim countries.



## **II. HISTORY OF ALOE VERA**

### **Regarding Aloe Vera's utilization, it has**

Long dating back to ancient times. In Mesopotamia, for instance, clay tablets from 1750BC indicate that the plant was used for medicinal or pharmaceutical purposes. Later, Egyptian texts from 550 BC describe how applying aloe could treat various skin infections. Historically, Aloe Vera has also been utilized to manage conditions like eczema, and it has served as both an insect repellent and a laxative. The Aloe Vera plant has a long history, valued for its health, medicinal, beauty, and skincare benefits over many centuries. The very name is descriptive: The term originates from the Arabic word. 'Alloeh, meanshining bitter substance,' and the Latin word 'Vera, means true. Years ago, Greek scientists discovered the medicinal uses of herbs. considered Aloe Vera "universal panacea. Oldest documented use of the plant is found to be Ebers Papyrus, an Egyptian medical datadating back to 16<sup>th</sup> century BC. In ancient Egypt, the plant was so esteemed that it was called the "plant of immortality," a fact recorded. A report featured in the *Indian Journal of Dermatology*. Historical evidence confirms that the plant was used across many regions, including This plant has a history of use in numerous countries, including China, Japan, India, Greece, Egypt, and Mexico. U.S. Notable figures who used it include Nefertiti and Cleopatra, two famous queens of Egypt incorporated its leaf into their daily beauty routines. Furthermore. Such individual Alexander the Great and Christopher Columbus utilized Aloe Vera. To administer treatment to their troops wounded in battle.

### **Aloe Vera's distinct parts:**

When analyzed structurally, the leaf of Aloe barbadensis has two distinct regions. sections that provide different therapeutic materials. The inner parenchymal tissue yields Aloe Vera gel, a clear, thin mucilage. The second part, the pericyclic tubules—a band of specialized cells. Is situated right under the leaf's green exterior.

### **Active Ingredient of Aloe barbadensis:**

More than 75 active components are present within the Aloe vera leaf's inner gel. These therapeutically significant substances belong to multiple chemical classes, These constituents encompass a wide variety of substances, including vitamins, minerals, enzymes, saccharides (sugars), phenolic compounds (notably anthraquinones), saponins, sterols, amino acids, and salicylic acid.

### **Phytochemistry of Aloe Vera:**

The chemical composition of Aloe Vera is highly complex, involving numerous bioactive molecules. includes a diverse array, comprising up to 200 distinct molecular types.

### **Pharmacological Activities**

Numerous international reports extensively detail the traditional and modern applications of A. barbadensis. its different form's including the whole leaf extract, the gel, and the latex—all of which are used to maintaining healthcare by modulating (adjusting or regulating) various biological functions.

#### **• Anti-inflammatory Action of Aloe Vera:**

The gel and various extracts derived from Aloe barbadensis Miller exhibit substantial anti-inflammatory effects. as measured by their effect on pERK levels. Specifically, their inhibitory action on the inflammation pathway marker NF-kB was proven to be as effective as, or more effective than, the pharmaceutical control diclofenac.

#### **• Anti-oxidative properties:**

The antioxidant effects of Aloe Vera (AV) extracts have been a key topic of scientific inquiry and documentation for the last several decades.



**Active components with its properties:**

The composition of Aloe Vera includes 75 constituents with potential biological activity which include various vitamins, enzymes, minerals, and sugars. It also contains specific organic compounds. Examples of these components are lignin, saponins, salicylic acid, and various forms of amino acids.

**Vitamin:**

The Aloe Vera plant contains a high concentration of various vitamins, notably the antioxidants vitamin C, vitamin E, and vitamin A (present as beta-carotene). By neutralizing destructive free radicals, these antioxidants execute their protective role in the body. Furthermore, Aloe Vera contains Vitamin B12, folic acid, and choline are also present in the substance.

**Enzyme :**

Eight distinct enzymes are found within Aloe Vera, including aliase, alkaline phosphatase, amylase, bradykinase, carboxypeptidase, catalase, cellulase, lipase, and peroxidase. The primary role of most of these enzymes is to assist in the breakdown of fats and sugars. Specifically, bradykinase is notable for its therapeutic effect. Its use on the dermal surface promotes the reduction of excessive inflammatory responses.

**Hormones :**

Aloe Vera contains plant hormones, specifically auxins and gibberellins. These compounds are beneficial because they promote wound healing and possess strong anti-inflammatory properties.

**Sugar and carbohydrates**

Aloe Vera contains both monosaccharides Components include monosaccharides (glucose and fructose) and long-chain polysaccharides (such as glucomannans also known as polymannose). [These sugars originated Sourced from the mucilage layer, these components are categorized as mucopolysaccharides.](#)

Regarding the sugar composition, mannose-6-phosphate stands out as the most significant simple sugar. The dominant polysaccharides are glucomannans, such as the  $\beta$ -(1,4)-acetylated mannan. Furthermore, Acemannan, a recognized glucomannan, has also been confirmed to be present.

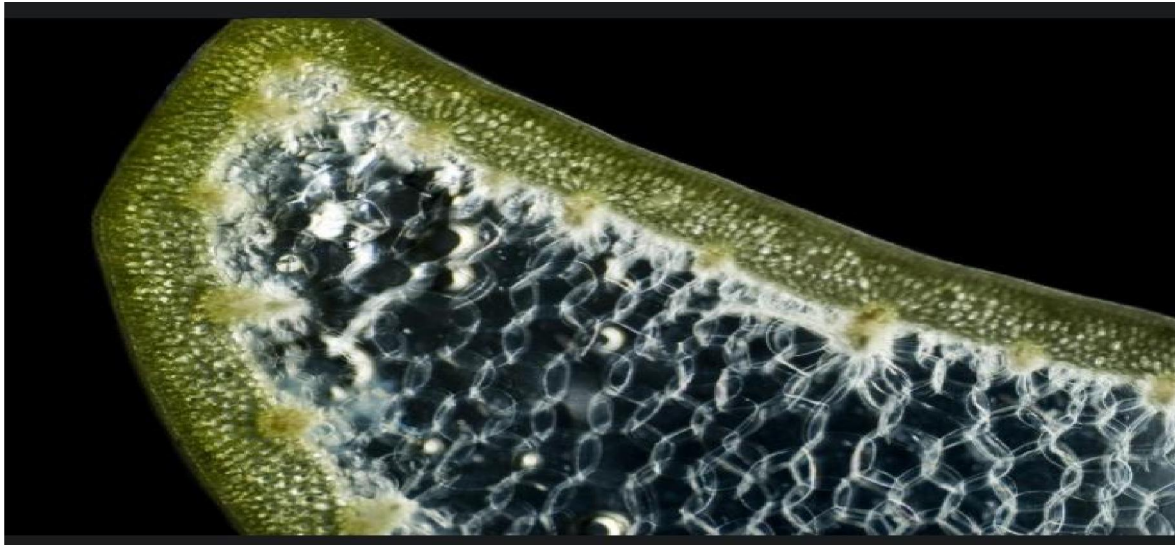
**Botanical Characteristics of Aloe Vera:**

Aloe Vera is categorized as xerophytic plant because it thrives in arid conditions. Perennial plant that grows in clumps. It possesses a substantial, fibrous root system. When the plant reaches maturity, which typically occurs around four years of age, it produces large basal leaves, usually numbering between 12 and 16 and collectively weighing up to 1.5 kg. The lifespan of the plant is approximately 12 years. The leaves reach lengths of up to 0.5 m and are 8 to 10 cm wide at the bottom. These leaves narrow to a point and feature serrated (saw-like) edges. In a cross-sectional view, [insert the final description, e.g., the leaf structure becomes visible]. The upper (adaxial) side of the leaf exhibits a slight concavity, contrasting with the pronounced convexity of the lower (abaxial) side.

**Aloe Vera classification and their uses:**

Aloe is traditionally valued for promoting youthful vitality. In traditional Indian medicine, specifically Ayurveda, Aloe is recognized for its beneficial effects on the female reproductive system. and is described as having properties that are rejuvenating, purifying (purgative), strengthening (tonic), and wound-healing (vulnerary). It is believed to balance all three core Ayurvedic constitutional principles: Vata, Pitta, and Kapha. The primary uses of Aloe Traditional Indian therapeutic practices utilize *Aloe Vera* for conditions such as colic, constipation, various skin issues, and parasitic worm infestations. Its common applications include serving as an anthelmintic (deworming), a laxative, a remedy for hemorrhoids, and a uterine stimulant.





When used Inmedicinal contexts, *Aloe* is applied to treat conditions like psoriasis and eczema, often in combination with licorice root. Furthermore, *Aloe* is consumed as a food, demonstrating uses outside of healthcare. Common practice, for example, is for people in Tamil Nadu, India, to use *A. Vera* to prepare a curry, which is then paired with Indian bread (like nan bread) or rice.

**Classification**

**Table 1: Classification of *Aloe vera***

<b>Kingdom</b>	<b>Plantae</b>
Clade	Angiosperms
<i>Clade</i>	Monocots
Order	Asparagales
Family	Asphodelaceae
Subfamily	Asphodeloideae
Genus	<i>Aloe</i>
Species	<b><i>A. vera</i></b>

**Mechanism of actions:**

**Aloe Vera’s Role in Wound Healing**

Specific components of Aloe Vera, such as gibberellins and mannans, are responsible for the plant’s healing properties. glucomannan (a polysaccharide rich in mannose) and gibberellin (a growth hormone). These substances work by interacting with growth factor receptors on cells called fibroblasts. This interaction stimulates the fibroblasts to become more active and multiply, leading to a significant boost in collagen synthesis when Aloe Vera is applied topically or consumed orally.

**Aloe gel performs several functions during wound repair:**

The substance boosts the total collagen level within the wound area. It improves quality of collagen, promoting the formation of more Type III collagen.



It enhances the cross-linking of the collagen fibers.

These effects collectively speed up wound contraction and strengthen the resulting scar tissue, increasing its breaking strength. Furthermore, research suggests that oral or topical Aloe treatment leads to a higher The production of both hyaluronic acid and dermatan sulfate in the forming granulation tissue of a wound that is repairing itself.

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#### **Skin Protection from Radiation Damage:**

Aloe Vera gel is known to offer a protective benefit to the skin against damage caused by both UV and gamma radiation.

While the precise mechanism of action is still being investigated, research indicates that applying Aloe Vera gel triggers Generating the antioxidant protein, metallothionein, specifically in the skin.

This protein functions to:

Scavenge harmful hydroxyl radicals, which are destructive The substance prevents the inhibition of other crucial antioxidant enzymes in the skin, specifically superoxide dismutase and glutathione peroxidase.

Additionally, Aloe Vera helps to prevent the immune system suppression often caused by UV exposure. It achieves this Through limiting the generation and secretion of immunosuppressive agents, [insert context, e.g., the substance provides a benefit].

signaling molecules By reducing the production and release of immunosuppressive (cytokines), such as interleukin-10 (IL-10), by skin cells (keratinocytes). This action, in turn, helps to maintain the skin's ability to mount.

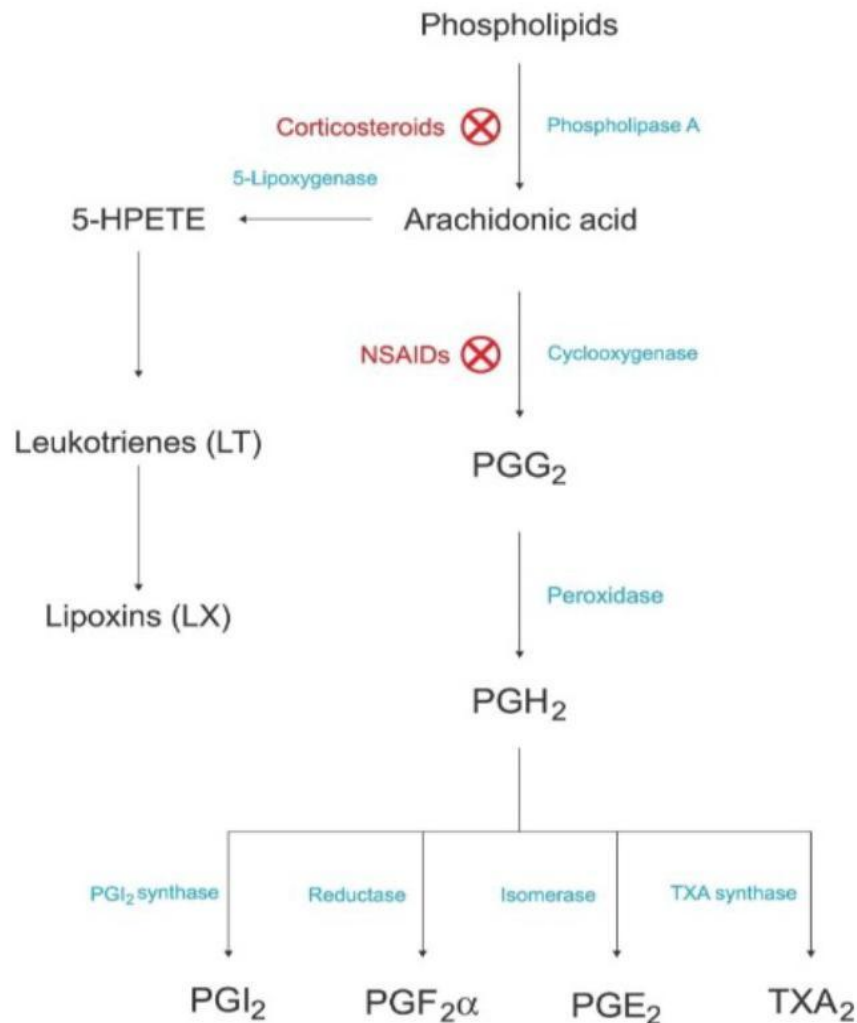
#### **How Aloe Vera Reduces Inflammation:**

The Aloe Vera plant contains properties that reduce inflammation. Primarily by interfering with the cyclooxygenase (COX) pathway. reducing the production and release of

immunosuppressive By inhibiting this pathway, Aloe Vera effectively reduces the production of prostaglandin E2 (PGE<sub>2</sub>) which is derived from arachidonic acid and is a key mediator of inflammation.

Furthermore, C-glucosyl chromone, a newly identified anti-inflammatory substance, has recently been extracted from the gel of the plant.





**Immunological Activity:**

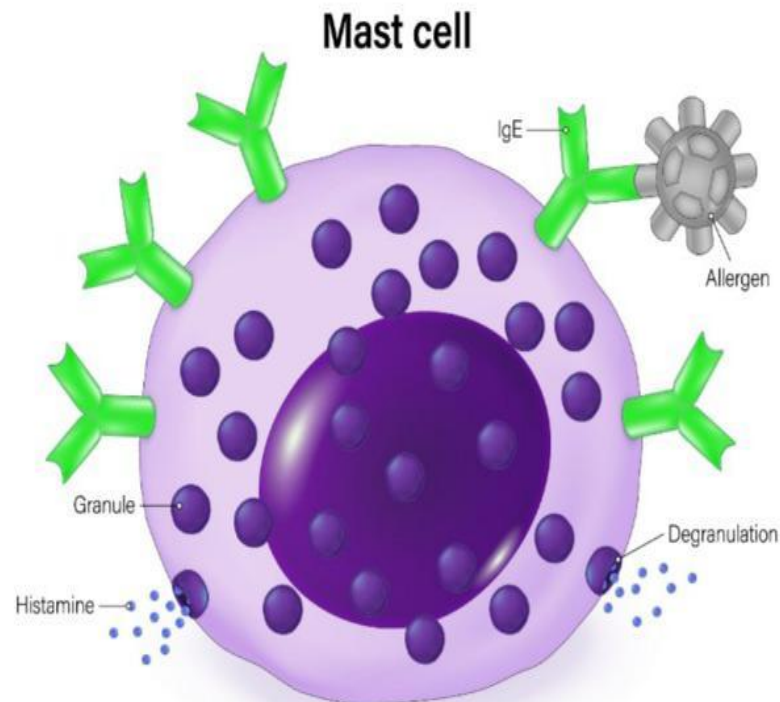
Mast Cell Stabilization: A specific compound in Aloe vera called Alprogen helps stabilize mast cells. It achieves this by inhibiting the influx of calcium ions into these cells, which subsequently blocks the release of inflammatory substances like histamine and leukotriene that are normally triggered by antigen-antibody reactions.

**Anti-Cancer Immunity:**

In studies involving mice implanted with sarcoma cells (a type of cancer), acemannan (a polysaccharide found in Aloe) was shown to be immunomodulatory. It stimulated macrophages in the mice to synthesize and release two key immune signaling molecules are interleukin-1 (IL-1) and tumor necrosis factor (TNF). This action initiated an immune response against the cancer, leading to the necrosis (death) and breakdown of the cancerous cells.

**Antioxidant Activity:** Additionally, Certain low-molecular-weight constituents in Aloe Vera have the ability to suppress the emission of reactive oxygen free radicals by cells that have been activated.





### Laxative Effects

The strong laxative action of The presence of anthraquinones within the plant's latex is considered responsible for the effects of Aloe Vera.

Compounds function in three main ways to promote a bowel movement:

They increase the amount of water within the intestine.

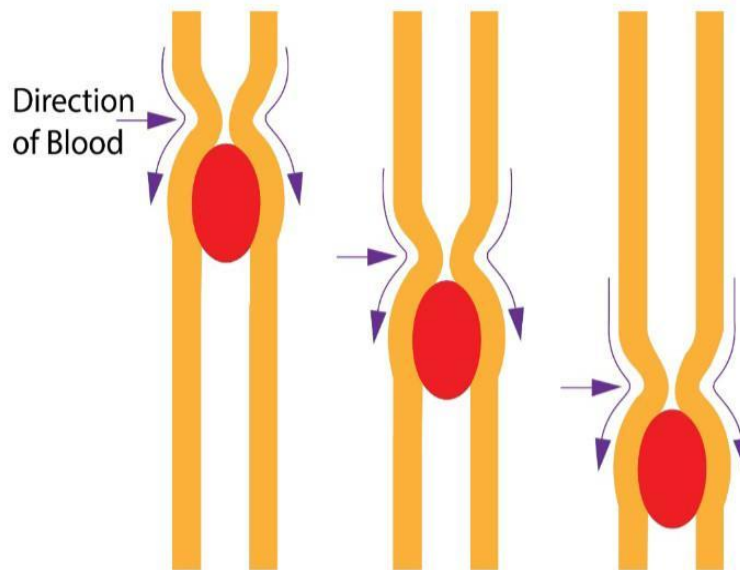
They stimulate Mucus production.

They increase involuntary muscular movement that propels contents through the gut.

### Clinical uses:

- 1) Clinical Use: Aloe Vera is widely used for various health applications.
- 2) Evidence Base: The current support for these uses is primarily based on anecdotal data.
- 3) Anecdotal Data: This means the evidence comes mostly from personal testimonies and observations.
- 4) Lack of Formal Proof: The uses generally lack rigorous, formal scientific proof.
- 5) Interesting Applications: Many of the reported uses are considered promising or “interesting.”
- 6) Need for Validation: There is a critical need to scientifically validate these claims.
- 7) Key Research Method: Controlled trials are the essential research method required for validation.
- 8) Purpose of Trials: These trials are needed to objectively measure and determine the plant’s effectiveness.
- 9) Scope of Inquiry: The effectiveness must be determined across all the diseases for which it is currently used.





Side effects:

•Topical Side Effects:

When applied topically, Aloe Vera may cause minor skin irritation, including redness, a burning sensation, or stinging.

In rare instances, sensitive individuals may develop a widespread rash, known as generalized dermatitis.

Allergic reactions are typically triggered by anthraquinones, chemical compounds found in the latex, Specifically, agents like aloin and barbaloin.

highly recommended to first apply They submitted the sample to a small test.patch of skin to check for any potential allergic or adverse reactions before widespread use.

•Oral Side Effects:

Gastrointestinal Issues: Symptoms such as abdominal cramps and diarrhea are common.

Other Immediate Effects: It may cause the urine to turn red and, in rare cases, can lead to hepatitis (liver inflammation).

Constipation Concerns: Its use may lead to dependency or even an aggravation of existing constipation over time.

Electrolyte Imbalance: Due to its laxative effect, oral Aloe Vera can lead to an imbalance in electrolytes, specifically causing dangerously low potassium levels.

## II. CONCLUSION

Scientific research has opened up the potential for using aloe extracts in combating bacterial infections and developing new anti-bacterial and anti-fungal products. Furthermore, the discovery of Aloe Vera's anti-inflammatory property provides a deeper understanding of its traditional use and suggests its potential as a supplementary drug alongside modern medicines. Ultimately, the text encourages further research to fully utilize this herb and other medicinal plants.

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