



Review Article

Nutraceutical and Medicinal Uses of Aloe Vera (*Aloe barbadensis*)

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ABSTRACT

This article elucidates the medicinal and pharmacological properties of Aloe vera, a widely recognized plant that thrives in semi-arid climates found in tropical and subtropical areas. The potential medical, therapeutic, and nutritional nutraceutical applications of *A. vera* components are highlighted in this article. Plants are grown for their agricultural, medicinal, and decorative qualities when kept indoors in pots. Plants are an excellent source of chemical components that exhibit a broad range of biological functions. One of Aloe Vera's most bioactive polysaccharide, acemannane, is known to modulate immunity and have anti-cancer, anti-oxidant, bone-healing, neuroprotective, and intestinal health-promoting properties. Since the beginning of time, people have employed the mucilaginous gel created by the parenchymal cells in the aloe vera pulp for a number of therapeutic purposes. Aloe vera has been utilized as a nutraceutical for many years. This page highlights significant applications of *A. vera* components as medicines and therapeutic foods. Aloe vera gel showed the presence of over 200 phytochemicals. Aloe vera gel is taken from the plant's leaves, and the final goods must be stabilized and prepared using the proper processing methods.

INTRODUCTION

Aloe vera is a perennial herb. It has light and vivid yellow blossoms. Aloe vera (*Xanthorrhoeaceae*: *Aloe barbadensis* Miller) [1]. The word "allae," which means "brilliant bitter substances" in Arabic, is the source of the English phrase "Aloe Vera." Although aloe leaves have long been used for fresh food and cosmetic and pharmacological purposes, it is uncertain what scientific principles underlie these benefits. Aloe vera's two main components are latex and gel. The latex, sometimes referred to as aloe juice or aloe

sap, is an exudate that is a bitter yellow color and accounts for 20–30% of the weight of the entire leaf [2]. It is produced by pericyclic tubules beneath the epidermal surface of the leaf. Younger leaves had higher levels of the latex component than older leaves. The pulp or mucilage from the parenchymatous cells of the plant in the inside part of the leaf is the tasteless, colorless gel on the opposite side. When using the entire Aloe Vera leaf, it can be challenging to determine if the biological action is

attributable to the gel or the latex because exudates chemicals can permeate gel during the gel manufacturing [3]. The colorless, mucilaginous gel from aloe vera leaves has long been used for cosmetic and medicinal purposes. Aloe vera has been utilized for thousands of years in traditional medicine due to its therapeutic benefits, notably for the skin. Aloe vera has also been demonstrated to have antioxidant, anticancer, antihyperlipidemic, and antidiabetic effects [4].

Therapeutic Effects And Its Mechanisms

Aloe vera is a traditional medicinal plant in many countries throughout the world [1]. The therapeutical effects and its mechanisms have been shown in figure 1.

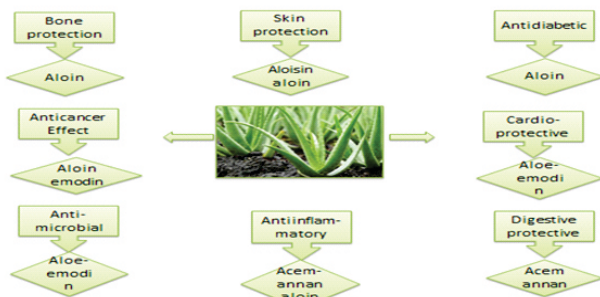


Figure 1: Therapeutic Effects of the Main Constituents of Aloe Vera

Medicinal Uses

Traditional medicine uses aloe vera as a skin treatment. Plants are mentioned in Ebers Papyrus, which dates from the sixteenth century BC, as well as in Pliny the Elder's Natural History and Dioscorides' De Materia Medica, both of which date from the middle of the first century AD [5]. Many nations' traditional herbal medicines make extensive use of this plant. Despite this, the sectors that deal in alternative and cosmetic medicine frequently tout the healing, moisturizing, and calming qualities of A. vera. [6]. A. vera gel is a widely used ingredient in yoghurts, drinks, and various desserts; nonetheless, it can be harmful at certain levels when applied directly or consumed. Aloe latex was also administered orally to treat a variety of ailments, including multiple sclerosis and glaucoma [7]. Latex contains anthraquinones, which are strong laxatives. It also raises intestinal peristalsis, mucus secretion, and intestinal water content [8]. There's not enough solid proof. A. vera is beneficial for burn or wound care. No solid data exist to support the effectiveness of topical A. vera use in the treatment of psoriasis or genital herpes [9]. Topical use of A. vera is offered to treat or guard against intravenous infusion-induced phlebitis. Sheep are artificially fertilized by diluting their semen with A. vera extract. In tiny farms, plant canopy is utilized to preserve water, while plant juice is employed as a preservative for fresh food [10]. A. vera seeds are also being explored for producing biofuels.

Although its topical application is not linked to any notable adverse effects, animals have occasionally been shown to develop cancer when consumed non-decolorized fluids [11]. A few types' yellow juice has also been shown to be carcinogenic to people. A. vera is used as an anti-irritant to lessen nasal chafing and as a moisturizer to keep the tissues of the face supple and sparkling. Thick plant sap is used by cosmetic industries to manufacture tissues, moisturizers, soaps, sunscreens, incense, shaving cream, and shampoos. Many hygiene products with a moisturizing and emollient effect are made with fresh plant sap [12]. In Aloin, a naturally occurring laxative substance, is extracted from the exudate of some aloe species. A. vera has possible toxicity, with side effects showing up at greater dosages when applied topically and when swallowed. Processing eliminates aloin before adding A. vera sap to make fairness creams. More precisely, aloe species that contain excessive amounts of aloin are not often used due to negative effects [13]. Medicinal uses of aloe vera are depicted in figure 2.

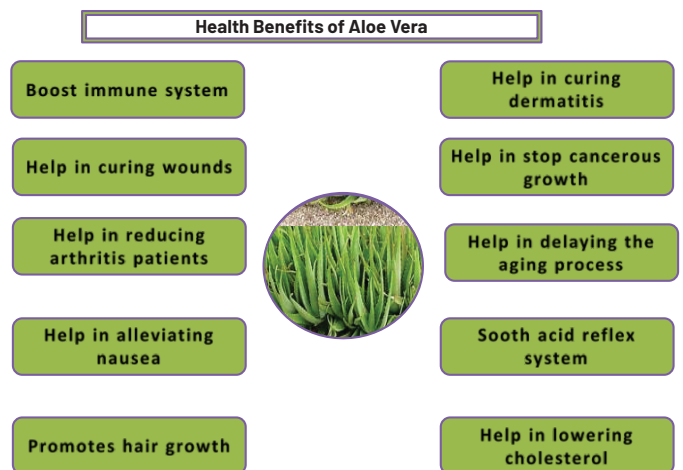


Figure 2: Medicinal Uses of Aloe Vera

Uses As Nutraceuticals

Juice from A. vera is promoted as helping to maintain the digestive system's health. Despite the fact that Ayurveda endorses its usage in several medical compositions, as shown in figure 3, no scientific proof is available. It is referred to as Ghrit Kumari in ancient manuscripts and is an important component of several digestive remedies [14]. According to scientific reports, excessive use of plant extracts is now considered dangerous, and the toxicity of these extracts seems to have dose-dependent effects. Aloe food products have components that demonstrate cancer prevention. Ingredients in A. Vera inhibit common foodborne bacteria. Proteolysis, ACE inhibition, and viability of putative probiotic cultures in fermented milk are impacted by Aloe barbadensis Miller [15]. To create edible films, a blend modification of soy protein and lauric acid use

A. vera polysaccharides. A. vera gel inhibits mushroom tyrosinase from several germ plasms. It was discovered that A. vera polysaccharides are effective in preventing long-term alcohol-induced hepatotoxicity in rats [16]. The chemical components of A. barbadensis Miller have been shown to suppress the action of phosphodiesterase-4D. When a large amount of crude A. vera is used orally, it might induce diarrhea and cramping in the abdomen, which can hinder the absorption of medications [17]. Lactobacilli's development and activity are impacted in vitro by A. vera juice. Its gel has bactericidal and/or bacteriostatic properties on *Listeria monocytogenes* cultures [18].

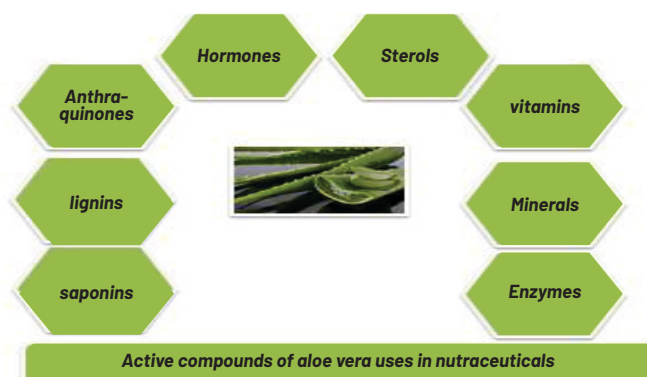


Figure 3: Active Compounds of Aloe Vera Used in Nutraceuticals

In diet-induced obese mice, dried A. vera gel powder decreases body fat mass, and in an experimental rat model, its gel shields the liver from damage caused by oxidative stress. Because A. vera gel powder has a long shelf life, it is utilized to maintain color stability while storing a range of packing materials. Apple slices are treated with A. vera gel to increase their shelf life. Rats are poisoned by pure, decolorized, low-anthraquinone whole leaf A. vera (L.) berm juice [19]. Though oral administration of Aloe rhein, and Aloe emodin showed therapeutic effects in rats, Aloe ferox seed is a promising source of oil for usage in pharmacological and cosmetic applications. Herboprobiotic treatment is employed in A. vera gel and extract for cardio protection [20]. Low dosages of A. vera extract used in the diet had immunological modulatory, cytokine-inducing, and antioxidant effects. Alzheimer's disease-related immunological and cognitive performance are impacted by the aloe poly-mannose multi-nutrient complex. Serious acute pancreatitis was reported to respond well to A. vera anthraquinones [21]. Rats with both normal and thrombotic focal cerebral ischemia produced by anthraquinones had antioxidant effects as well. In various growth stages, aloin demonstrated α -glucosidase inhibitory and antioxidant activities both with and without camel β -casein and its peptides. Although A. vera is an anti-diabetic, over consumption of it caused cancer in F344/N rats [22]. An effective supplement beverage to combat

dehydration is made with stabilized, diluted A. vera gel [23].

CONCLUSIONS

A. vera is a tiny, versatile farm field plant with many different uses and qualities. It has a variety of compounds with different biological activities that are pharmacologically active. Literature indicates that plants have great therapeutic value and can be used for healing. Many nations' traditional herbal medicines make extensive use of this plant. For the manufacture of pain-relieving, moisturizing, face-shining creams, makeup products, plants are a good choice for the cosmetic and pharmaceutical industries. Aloe vera juice and gel protect people from sunburn. In tropical nations, A. vera gel is sold as a component in yoghurts and other drinks.

Authors Contribution

Conceptualization: SZUHZ, MUMA, TA, WA
Writing-review and editing: MKN, QAS, AA, SI, FS, MAI
All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

- [1] Vitale S, Colanero S, Placidi M, Di Emidio G, Tatone C, Amicarelli F et al. Phytochemistry and biological activity of medicinal plants in wound healing: an overview of current research. *Molecules*. 2022 Jun; 27(11): 3566. doi: 10.3390/molecules27113566.
- [2] Guo X and Mei N. Aloe vera: A review of toxicity and adverse clinical effects. *Journal of Environmental Science and Health, Part C*. 2016 Apr; 34(2): 77-96. doi: 10.1080/10590501.2016.1166826.
- [3] Javed S. Aloe vera gel in food, health products, and cosmetics industry. *Studies in Natural Products Chemistry*. 2014 Jan; 41: 261-85. doi: 10.1016/B978-0-444-63294-4.00009-7.
- [4] Pothuraju R, Sharma RK, Onteru SK, Singh S, Hussain SA. Hypoglycemic and hypolipidemic effects of Aloe vera extract preparations: A review. *Phytotherapy Research*. 2016 Feb ;30(2) :200-7. doi: 10.1002/ptr.5532.
- [5] Sánchez M, González-Burgos E, Iglesias I, Gómez-Serranillos MP. Pharmacological update properties of Aloe vera and its major active constituents. *Molecules*. 2020 Mar; 25(6): 1324. doi: 10.3390/molecules25061324.
- [6] López Z, Núñez-Jinez G, Avalos-Navarro G, Rivera G, Salazar-Flores J, Ramírez JA et al. Antioxidant and

- cytotoxicological effects of Aloe vera food supplements. *Journal of Food Quality*. 2017 Jan; 2017: 10. doi: 10.1155/2017/7636237.
- [7] Upadhyay RK. Nutraceutical, therapeutic, and pharmaceutical potential of Aloe vera: A review. *International Journal of Green Pharmacy (IJGP)*. 2018 May; 12(01).
- [8] Cosmetic Ingredient Review Expert Panel. Final report on the safety assessment of Aloe andongensis extract, aloe andongensis leaf juice, aloe arborescens leaf extract, aloe arborescens leaf juice, aloe arborescens leaf protoplasts, aloe barbadensis flower extract, aloe barbadensis leaf, aloe barbadensis leaf extract, aloe barbadensis leaf juice, aloe barbadensis leaf polysaccharides, aloe barbadensis leaf water, aloe ferox leaf extract, aloe ferox leaf juice, and aloe ferox leaf juice extract. *International Journal of Toxicology*. 2007; 26(2):1-50. doi: 10.1080/10915810701351186.
- [9] Maenthaisong R, Chaiyakunapruk N, Niruntraporn S, Kongkaew C. The efficacy of aloe vera used for burn wound healing: a systematic review. *Burns*. 2007 Sep; 33(6): 713-8. doi: 10.1016/j.burns.2006.10.384.
- [10] Serrano M, Valverde JM, Guillén F, Castillo S, Martínez-Romero D, Valero D. Use of Aloe vera gel coating preserves the functional properties of table grapes. *Journal of Agricultural and Food Chemistry*. 2006 May; 54: 3882-6. doi: 10.1021/jf060168p.
- [11] Gupta RC, Srivastava A, Lall R. Toxicity potential of nutraceuticals. *Computational Toxicology: Methods and Protocols*. 2018: 367-94. doi: 10.1007/978-1-4939-7899-1_18.
- [12] Eshun K and He Q. Aloe vera: A valuable ingredient for the food, pharmaceutical and cosmetic industries-a review. *Critical Reviews in Food Science and Nutrition*. 2004 Mar; 44: 91-6. doi: 10.1080/10408690490424694.
- [13] Samantar O. Shining Sun and Blissful Wind: Access to ICT Solutions in Rural Sub-Saharan Africa Through Access to Renewable Sources. *Sustainable Development Law & Policy*. 2012; 12(3): 9.
- [14] Surjushe A, Vasani R, Saple DG. Aloe vera: A short review. *Indian Journal of Dermatology*. 2008; 53: 163-6. doi: 10.4103/0019-5154.44785.
- [15] Basannavar S, Pothuraju R, Sharma RK. Effect of Aloe vera (*Aloe barbadensis miller*) on survivability, extent of proteolysis and ACE inhibition of potential probiotic cultures in fermented milk. *Journal of the Science of Food and Agriculture*. 2014 Oct; 94: 2712-7. doi: 10.1002/jsfa.6615.
- [16] Saito M, Tanaka M, Misawa E, Yamada M, Yamauchi K, Iwatsuki K. Aloe vera gel extract attenuates ethanol-induced hepatic lipid accumulation by suppressing the expression of lipogenic genes in mice. *Bioscience, Biotechnology, and Biochemistry*. 2012 Nov; 76: 2049-54. doi: 10.1271/bbb.120393.
- [17] Zhong J, Huang Y, Ding W, Wu X, Wan J, Luo H. Chemical constituents of *Aloe barbadensis miller* and their inhibitory effects on phosphodiesterase-4D. *Fitoterapia*. 2013 Dec; 91: 159-65. doi: 10.1016/j.fitote.2013.08.027.
- [18] Reyes JE, Guanoquiza MI, Tabilo-Munizaga G, Vega-Galvez A, Miranda M, Pérez-Won M. Microbiological stabilization of Aloe vera (*Aloe barbadensis miller*) gel by high hydrostatic pressure treatment. *International Journal of Food Microbiology*. 2012 Sep; 158: 218-24. doi: 10.1016/j.ijfoodmicro.2012.07.019.
- [19] Shao A, Broadmeadow A, Goddard G, Bejar E, Frankos V. Safety of purified decolorized (low anthraquinone) whole leaf Aloe vera (*L. burm. F.*) Juice in a 3-month drinking water toxicity study in F344 rats. *Food and Chemical Toxicology*. 2013 Jul; 57: 21-31. doi: 10.1016/j.fct.2013.03.002.
- [20] Yadav H and Jain S. Herbo-probiotic therapy in cardioprotection: A new way of nature to nurture. *Nutrition*. 2013 Jul; 29: 1070-1. doi: 10.1016/j.nut.2012.11.001.
- [21] Yang YM, Wang P, Zhang Y. A comparative study on the absorption kinetics parameters of rhubarb free anthraquinones between normal dogs and dogs with severe acute pancreatitis. *Zhongguo Zhong Xi Yi Jiehe Zazhi= Chinese Journal of Integrated Traditional and Western Medicine*. 2012 Apr; 32: 494-8.
- [22] Lee S, Do SG, Kim SY, Kim J, Jin Y, Lee CH. Mass spectrometry-based metabolite profiling and antioxidant activity of Aloe vera (*Aloe barbadensis miller*) in different growth stages. *Journal of Agricultural and Food Chemistry*. 2012 Nov; 60: 11222-8. doi: 10.1021/jf3026309.
- [23] Sehgal I, Winters WD, Scott M, David A, Gillis G, Stoufflet T et al. Toxicologic assessment of a commercial decolorized whole leaf Aloe vera juice, lily of the desert filtered whole leaf juice with aloesorb. *Journal of Toxicology*. 2013 Mar; 2013: 802453. doi: 10.1155/2013/802453.