

Aloe Vera (*Aloe barbadensis miller*) and Its Natural Ingredients: A Mini Review

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Abstract

Aloe Vera gel extracted from the aloe Vera plant was most commonly used in cosmetics and other beauty-related products. For the determination of its efficacy in human health and identification of active compounds in aloe Vera many trials had been done. Although it also had some clinical importance it might be very effective for genital herpes, diabetes mellitus, and many other allergic reactions. Some studies also show that oral administration of aloe Vera gel or its syrup might be useful for lowering glucose level in the blood and might be effective in diabetic patients that are suffering from this disorder. Beside its beneficial properties aloe Vera were also being loaded with some carcinogen that causes cancer upon oral administration. This paper will review the naturally occurring ingredients found in aloe Vera and its therapeutic uses and we will also discuss its side effects.

Keywords: Aloe Vera, diabetes mellitus, carcinogen, cancer, allergic reactions, genital herpes, therapeutic uses, cosmetics

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1. Introduction

Aloe Vera plant or gel extracted from this plant contains a lot of beneficial nutrients, enzymes, and many bioactive compounds. And for many centuries it had also been utilized and used in medicine and cosmetics [1] [2]. Aloe Vera is one of the more than 400 species of aloe belonging to the family Liliaceae that originated in South Africa[3]. Aloe Vera is a cactus-like plant that grows readily in dry, hot climates and currently is cultivated in large quantities because of its demand, which is increasing day by day [4]. Today this plant has also been utilized for many purposes in dermatology [2]. Carbohydrates fraction obtained from aloe Vera showed significant increase in haematological and hematopoietic activity [5]. Chemical analysis of aloe Vera gel shows that it also contains mannose polymers among those Acemannan is of great importance [6]. However some studies show that ingestion of this plant or its preparation were directly concerned with some disorders like kidney failure, hypokalaemia and hypersensitive reactions [7]. Some studies also reveal that oral administration of aloe Vera extract for 13 weeks to healthy mice resulted in goblet cell hyperplasia of the large intestine in these mice [8]. The name “Plant of immortality” were given by Egyptians to this plant for its numerous benefits [2].

2. Aloe Vera Plant

Aloe Vera plant belongs to the family Asphodelaceae and its botanical name is *Aloe Barbadensis miller* (Figure 1) [2]. The growing conditions for aloe Vera are hot humid and high rainfall but most species of aloe Vera grows in sandy soils [9] Aloe Vera plant were xerophyte specie in nature but some studies shows that this plant were least xerophyte specie as compared to *Euphorbia milii* which were most xerophytic specie in nature. This is due to the presence of tetracytic stomata in aloe Vera which were responsible for high rate of transpiration while *Euphorbia milii* contain paracytic stomata [10, 11].



Figure 1: *Aloe Barbadensis miller* and isolated salicylic acids

2.1 Aloe Vera Active Ingredients

Aloe Vera contains many ingredients or components some of them are Enzymes, Carbohydrates, minerals, amino acids, and vitamins etc.

2.2. Chemical constituents

Aloe Vera plant contains aloins which are classified into two classes

- I) Barbaloins

II) Nataloins

Nataloins when treated with nitric acid gives us oxalic and picric acid while barbaloins give us chrysammic and aloetic acid when treated with nitric acid [12].

2.3. Antioxidant Enzymes

Aloe Vera plant also contain alkaline phosphatase, amylase, bradykinase, carboxypeptidase, catalase, cellulose lipase. Raspberry fruits (*Rubus spp*) when coated with Aloe Vera gel and then assayed for antioxidant enzymatic activity. The activities of these antioxidant enzymes were greatly enhanced by this technique, these enzymes includes glutathione peroxidase, glutathione reductase, superoxide dismutase, ascorbate peroxidase, and guaiacol peroxidase [2, 13].

2.4. Hormones in Aloe Vera

The hormones found in aloe Vera were auxin and gibberellins, they promote wound healing and also anti-inflammatory in nature [14] some studies also shows a decline in the gonadotropin or sex hormones e.g. testosterone when alcoholic extract of aloe plant were orally administrated to male rats [15].

2.5. Lipids in Aloe Vera

Aloe Vera also contain a lot a fatty acids molecule. Phosphatidic acid and sulfoquinovosyl diglyceride are most commonly found in aloe Vera plant. Aloe Vera gel extract also contain butyric acid. This butyric acid had a therapeutic role in human health [16, 17].

2.6. Carbohydrates in Aloe Vera

Aloe Vera leaf gel also contains a lot of carbohydrates. The major carbohydrate found in Aloe Vera are Acemannan. This carbohydrates had a therapeutic role in wound healing and also stimulate our immune system [18].

2.7. Vitamins in Aloe Vera

The Aloe Vera extract were also loaded with many important therapeutic vitamins like vitamin (F, C, A), niacin and riboflavin [19, 20] Aloe Vera also contain vitamin B12 and folic acid and were considered as a useful source for vitamins [12].

2.8. Minerals in Aloe Vera

Aloe Vera plant contain a lot of minerals some of the major minerals found in aloe Vera extract are the following. Zinc, sodium, potassium, calcium, iron, chromium, and magnesium [20] Some studies also reveals that aloe Vera plantation near wastewater helps to scavenge the trace elements e.g. Pb, Cd from soil [21].

2.9. Anthraquinones in Aloe vera

Aloe Vera gel contain a lot of useful compounds but one of its beneficial compound is anthraquinones. Anthracene is a type of anthraquinones found in aloe Vera and is also well known for its analgesic and anti-inflammatory properties [22].

2.10. Therapeutic Uses of Aloe Vera

Some therapeutic uses of aloe Vera are the following.

2.11. Anti-allergic properties

Alprogen an anti-allergic component purified from crude aloe extract plays a crucial role in the inhibition of DAG (1, 2- diacylglycerol) and phospholipase A2 during the mechanism of mast cell activation. And it also block Calcium ion influx during mast cell activation and finally lead to the inhibition of histamine and leukotriene which causes allergic reactions [23].

2.12. Wounds healing

Aloe Vera gel had a great effect on the wound healing mechanism. A research on wound healing properties of aloe Vera clearly shows that 80% healing were observed in animals when treated with aloe gel preparation [24]. Aloe in minor dose improves wound healing property of skin when used in decolorized form without (anthraquinones) [25]. When Aloe Vera aqueous extract were applied on wounds it greatly enhanced the healing mechanism [26]. Aloe Vera also contain a sugar known as mannose-6-phosphate, this sugar helps in wound healing [27].

2.13. Aloe Vera Against radiation

Some research studies show the radioprotective potential of Aloe Vera extract. Radiation like X-rays were used in mice pretreated with aloe Vera extract .After this treatment there were enhancement in the antioxidant status and testicular parameters, and inhibition of peroxide as compared to the control group [28].

2.14. Antiseptic Properties of Aloe Vera

Aloe Vera plant were also loaded with many antiseptic compounds some of them are sulphur, cinnamonic acid, phenols, salicylic acid [12]. These compounds shows inhibitory responses against human and animal pathogens like viruses, bacteria etc [29].

2.15. Antidiabetic Properties of Aloe Vera

Studies conducted that oral administration of aloe Vera juice for 2 weeks twice a day in diabetic patients clearly shows that their blood glucose level were much reduced [30] Some studies also shows that phytosterols (24 ethyl lophenol, lophenol, 24 methyl lophenol, 24 methylene cycloartanol, and cycloartanol) and gel extracted from aloe Vera plant would be useful in treating diabetes mellitus [31].

2.16. Immune system Enhancer

Acemannan a polysaccharides helps in the activation of toll like receptors TLR and thus plays a crucial role in the activation of immune responses.it also enhances immune responses against viruses [32]. The TLR are conserved receptors and its function is to identify PAMP (Pathogen specific molecular pattern) [33]. They are located in the plasma membrane of T cells.

2.17. Antibacterial and Antifungal activity

A research carried out for finding the antibacterial and antifungal activity of bacterial and fungal strains by using ethanol extract from aloe Vera. The result were quite surprising, the zone of inhibition formed by fungus e.g. *Aspergillus niger* were 19mm and thus zone of inhibition of bacterial strain were almost 11-18mm.[34] Silver nanoparticles synthesized from aloe Vera extract also shows mosquitocidal effects [35]. Aloe Vera plant extract also shows antifungal activity against mycelia of phytopathogenic fungi using Czapek-agar medium [36].

2.18. Anti-inflammatory action

In certain inflammatory conditions Aloe Vera has a therapeutic role and it may be used as an anti-inflammatory agent e.g. inflammatory bowel disease [37]. Anthracene, a type of anthraquinones were commonly used in veterinary medicine to treat inflammation [22].

2.19. Anti-tumor activity

Studies were carried out to investigate the antitumor properties of naturally occurring herbs aloe Vera and *calligonum comosum*, to suppress the growth of hepatocellular carcinoma cells. At the end of this research work it was concluded that these two naturally occurring herbs induce cytotoxic effect on hepatocellular carcinoma and thus activate the apoptotic pathways [38].

3. Uses in cosmetics

Aloe Vera plants were most commonly used in cosmetic products. It is also used as a skin healer and it also protects the epithelial tissue of the skin from any injury. The problem of acne in the skin could be cured by using aloe Vera gel [1]. The crude extract of Aloe Vera was also effective for certain inflammatory skin conditions e.g. seborrheic dermatitis [39].

4. Heartburn and Ulcer

Gastroesophageal reflux disease GERD is a disorder of the human digestive tract that has vast categories of symptoms just like chest pain, heartburn, acid reflux, ulcer etc [40]. To overcome the symptoms of GERD aloe Vera along with pantoprazole may be useful and it also had less or no side effects [41]. In other clinical studies conducted in patients suffering from GERD, by administration of aloe Vera gel syrup their symptoms were completely eliminated [42]. Aloe Vera juice is also useful for healing wounds in the stomach and also used to prevent ulcers. It also helps to stimulate the secretion of pepsin in the stomach [43].

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