



P-ISSN: 2349–8528

E-ISSN: 2321–4902

IJCS 2017; 5(6): 967-969

© 2017 IJCS

Received: 16-09-2017

Accepted: 20-10-2017

Amreen Nazir

Division of Food Science &
Technology SKUAST, K
Shalimar, Jammu and Kashmir,
India

Dr. Hafiza Ahsan

Division of Food Science &
Technology SKUAST, K
Shalimar, Jammu and Kashmir,
India

Health benefits of aloe vera: A wonder plant

Amreen Nazir and Dr. Hafiza Ahsan

Abstract

The name Aloe vera is derived from the Arabic word “Alloeh” meaning “shining bitter substance,” while “vera” in Latin means “true” (Haque *et al.* 2014) [15]. Phytochemistry of aloe vera gel has revealed the presence of more than 200 bioactive chemicals (Ahlawat *et al.* 2011) [1] which includes Anthraquinones like Aloe-emodin, aloetic acid, anthranol, aloin A and B (or collectively known as barbaloin), isobarbaloin, emodin and ester of cinnamic acid, Carbohydrates (Pure mannan, acetylated mannan, acetylated glucomannan, glucogalactomannan, galatan, galactogalacturan, arabinogalactan, galactoglucoarabinomannan, pectic substance, xylan, cellulose, chromones, isoaloeresin-D, isoarabaichromone and nealoenin A), Enzymes (amylase, carboxypeptidase, catalase, cyclooxygenase, cyclooxygenase, lipase, oxidase, phosphoenolpyruvate carboxylase and superoxide dismutase) etc. In food industry, aloe vera has been utilized as a source of functional food like drinks, jams, and other beverages including tea. Health benefits of aloe vera include its application in wound healing, treating burns, minimizing frost bite damage, protection against skin damage from x-rays, lung cancer, intestinal problems, increasing high density lipoprotein (HDL), reducing low density lipoprotein (LDL), reducing blood sugar in diabetics, fighting acquired immune deficiency syndrome (AIDS), allergies and improving immune system (Nandal *et al.* 2012) [25]. It is the best herbal answer to support the health and healing mechanisms of the body because it does not heal, rather it feeds the body’s own systems in order for them to function optimally and be healthy. However the industries involved in processing of aloe vera need Government surveillance to ensure that the aloe vera products have beneficial bio-active chemicals as per claims of the manufacturers. Regulatory bodies also need to look into the safety and toxicological aspects of aloe vera products for food applications.

Keywords: Aloe Vera, HDL, LDL, Functional foods

Introduction

Aloe was originated in tropical Africa and it is now cultivated in warm climatic areas of Asia, Europe and America. The aloe vera has many common names and often referred to as burn plant, first aid plant or medicine plant. Aloe vera is known by a number of names in the literature i.e. Aloe barbadensis Mill, Aloe chinensis Bak, Aloe elongate Murray, Aloe indica Royale, Aloe officinalis Forsk, Aloe perfoliata, Aloe rubescens DC, Aloe vera L. var. littoralis Konig ex Bak, Aloe vera L. var. chinensis Berger, Aloe vulgaris Lam. Presently, the use of aloe vera has gained popularity because of herbal movement initiated by naturopaths, yog gurus, alternative medicine promoters and holistic healers. The industry size for aloe raw material is estimated to be about \$125 million dollars. The volume of the industry for finished products containing aloe vera is alleged to be around \$110 billion dollars.

Botany of aloe vera

Aloe vera is a spiky cactus like xerophytes. It is a clump forming perennial plant with thick fibrous root which produces large basal leaves, usually 12–16 per plant, weighing up to 1.5 kg when mature. The plant matures when it is about 4 years old and has a life span of about 12 years. The leaves are up to 0.5 m long and 8–10 cm across at the base, tapering to a point, with saw-like teeth along their margins. The plant can be harvested every 6–8 weeks by removing 3–4 leaves per plant. Red, yellow, purple or pale stripped flowers are present most of the year growing in a long raceme at the top of the flower stalk which originates from the centre of the basal leaves. The flower stalk grows up to 1.5 m in height. There are over 250 species of aloe grown world over. However, only two species are grown commercially i.e. Aloe barbadensis Miller (Aloe vera) and Aloe arborescens. There are at least two other species that have medicinal properties namely Aloe perry baker and Aloe ferox. Most aloe vera plants are non-toxic but a few are extremely poisonous containing a hemlock like substance (Atherton 1998) [4].

Correspondence**Amreen Nazir**

Division of Food Science &
Technology SKUAST, K
Shalimar, Jammu and Kashmir,
India

Aloe variegata is a dwarf species which is only a few centimeter in diameter and is a popular house plant.

Health Benefits

The aloe vera gel contains many vitamins including the important antioxidant vitamins A, C and E. Vitamin B1 (thiamine), niacin, Vitamin B2 (riboflavin), choline and folic acid are also present (Lawless and Allen 2000). Aloe vera gel derived from the leaf pulp of the plant has become a big industry worldwide due to its application in the food industry. It is utilized in functional foods especially for the preparation of health drinks with no laxative effects. It is also used in other food products including milk, ice cream, confectionery, etc. Aloe vera gel is also used as flavoring component and preservative in some foods (Christaki and Florou-Paneri 2010). Thus, a simple and efficient processing technique needs to be developed especially for the aloe beverage industry to improve product quality and safety by preserving the bioactive chemicals naturally present in the intact aloe vera leaf (Eshun and He 2004) [12]. Aloe vera is known to be beneficial in the treatment of heart diseases, Arthritis, cancer, Diabetes, etc. Some of the health benefits of aloe vera may be summarized as below

Heart Diseases

Researchers have found that *Aloe vera* easily stimulates the fibroblasts for making new tissues. When fibroblasts are stimulated, proteoglycans, collagens are formed and thus risk of cardio vascular disorders decreases. Test groups given *Aloe vera* showed a decrease in total cholesterol, triglyceride, phospholipids and non-esterified fatty acid levels, each of which, when elevated, seem to accelerate the accumulation of fatty material in large and medium sized arteries, including the coronary arteries of the heart (Balch and James, 2000; Joseph and Justin, 2010) [6, 5].

Arthritis

Aloe vera juice plays a very important role in treating arthritis patients. Aloe juice is a stimulant to the immune system due to presence of different enzymes. It is a powerful anti-inflammatory agent, analgesic, is able to speed up cell growth, thus it repairs arthritis damaged tissue. *Aloe vera* juice, when taken orally and applied externally, helps in repair process by regenerating cell and detoxifying the affected area. *Aloe vera* is believed to reduce severe joint and muscle pain associated with arthritis, as well as pain related to tendinitis and injuries. When applied directly to the area of pain, *Aloe vera* penetrates the skin to soothe the pain. Studies have also found that ingestion of *Aloe vera* on a daily basis can help prevent and cause a regression of adjuvant arthritis (Joseph and Justin, 2010) [5]. (Rabe and Staden, 1997; Barcroft 1999; Balch and James, 2000) [18, 6]

Cancer

Aloe vera juice enables the body to heal itself from cancer and also from the damage caused by radio and chemotherapy that destroys healthy immune cells crucial for the recovery. *Aloe vera* acts as radiation protectors and inhibits testicular damage from gamma radiation and reduces cancer. Acemannan is the major carbohydrate fraction obtained from *Aloe vera* leaf. This fraction promotes wound healing, has antiviral, anticancer and immune stimulation effect (Zhang and Tizard, 1996). Compounds extracted from *Aloe vera* have been used as an immunostimulant that aids in fighting cancers in cats

and dogs (King *et al.*, 1995). *Aloe vera* emodin, an anthraquinone, has the ability to suppress or inhibit the growth of malignant cancer cells making it to have antineoplastic properties (Thomson, 2004).

Diabetes

Type II diabetes is one of the leading causes of death worldwide (Jones and Aloecorp, 2005) [11]. Studies have shown that diabetics appear to have decreased antioxidant defense capability with lower levels of specific antioxidants such as vitamin C and E or reduced activities of antioxidant enzymes (Jones and Aloecorp, 2005) [11]. Researchers have found that Aloe plant polysaccharides have the potential to control blood sugar, stimulate the body's own antioxidant production and even lower cholesterol (Jones and Aloecorp, 2005) [11]. It lowers glucose and triglycoside levels in diabetic patients. *Aloe vera* juice enhances absorption of nutrients and maintains the sugar balance in blood by improving digestive functioning. *Aloe vera* may enhance the action of the drugs or herbal preparations used with insulin for a diabetic (Urch and David, 1999) [24].

Inhibitory Activity against Microorganisms

Numerous studies have elucidated the antagonistic activity of *Aloe vera* against fungi, virus and bacteria and it was screened against selected clinical pathogens by agar diffusion method using aqueous, ethanol and acetone extract of *Aloe vera* and showed that paramount enmity activity against bacteria and fungus was present in acetone extract (Esteban, A. *et al.*, 2000, Saks, Y, *et al.*, 1995, Sebastian, N.E, *et al.*, 2010, Talmadge, J, *et al.*, 2004) [9, 21, 22, 23]. The growth of *Helicobacter pylori* is hindered by the *Aloe vera* in a dose-dependent manner. The sterol extract showed higher activity against *Streptomyces. greseus* and *Candida albicans* as compared to other bacteria and fungi when screened for antibacterial and antifungal activities respectively. The inhibitory property of *Aloe vera* towards the growth of bacteria and fungi can prove to be an additional asset in the therapeutic role that the plant plays in the current pharmaceutical industry.

Immunomodulatory Effects

Another potential characteristic of immunomodulatory activity of *Aloe vera* was exhibited in various animal models. Reynolds, T. *et al.*, (1994) reported that polysaccharides of the inner gel of *Aloe vera* have a varied immunomodulatory activity. Akhtar *et al.*, (2012) [2] has reported immunostimulatory and protective effects of *Aloe vera* against coccidiosis in industrial broiler chickens.

Antioxidant Activity

It has been reported by several authors that different fractions of *A. vera* as well as unfractionated whole gel have anti-oxidant effects. Glutathione peroxidase activity, superoxide dismutase enzymes and a phenolic antioxidant were found to be present in *A. vera* gel, which may be responsible for these anti-oxidant effects. It was found that *A. vera* gel in a concentration of 1 in 50 also inhibited prostaglandin E₂ production from inflammatory colorectal biopsies, but had no effect on thromboxane B₂ release. A 3 year old plant extract exhibited strong radical scavenging activity of 72.19% which is significantly higher than BHT having 70.52% & alpha tocopherol with 65.65% (Langmead, 2004) [14].

Hepatoprotective Activities

An aqueous extract of dried aerial parts of *A. vera* significantly reduced hepatic damage induced by carbon tetrachloride in mice and reversed certain biochemical parameters. Increase in bile flow and bile solids as a result of treatment with the extract suggests stimulation of the secretory activity of the liver cells. The hepatoprotective action was also attributed to preserving the metabolizing enzymes of the liver through an antioxidant activity (Alves *et al.*, 2004)^[3]

Conclusion

The aloe vera industry is flourishing worldwide and the gel is used in many products including fresh gel, juice and other formulations for health, medicinal and cosmetic purpose.

However, the expanding aloe vera industry urgently needs reliable testing protocols to assess the quality and quantity of bioactive chemicals present in the final products. The product claims must be tested by intensive clinical trials, verified and certified by the Government regulatory authorities to build consumer confidence and to ensure safety of the aloe vera products.

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