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Component and Application Aloe Vera Plant in medicine

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Abstract

For centuries, Aloe Vera has been used by many different cultures. The ancient Greeks, the Romans, the Babylonians, Indians and the Chinese have all used Aloe Vera as a medicinal plant. One of the common experimental cancer models is sarcoma-180. When Aloe was administered to mice bearing S-180 tumors, the tumor growth was inhibited. Aloe vera is a dietary supplement and not a regulated drug. There is no guarantee of strength, purity, or safety of these products. Aloe vera is approved by the Food and Drug Administration as a food additive for flavor.

Key words: Aloe Vera, Medicine plant, Food additive

Introduction

For centuries, Aloe Vera has been used by many different cultures. The ancient Greeks, the Romans, the Babylonians, Indians and the Chinese have all used Aloe Vera as a medicinal plant. Throughout the years, Aloe Vera (Aloinae) has been called many things: Potted Physician, Wand of Heaven, Wonder Plant, Heaven's Blessing, and Plant of Life. Botanists have identified at least 200-300 different types of Aloe Vera plants. Of all these types of Aloe, only five have demonstrated medical benefits: Aloe Barbadensis Miller, Aloe Perryi Baker, Aloe Ferox, Aloe Arborescens and Aloe Saponaria. Aloe Barbadensis Miller is the most widely used as well as the most potent. Indigenous to Africa, it is now grown all around the world specifically in warmer, drier climates. The structures of most Aloe plants are very similar. Aloe grows to maturity in approximately four years, at which time the leaves begin to sprout. They taper to a point near the top of the plant, and the leaves have soft spines every few inches lining their silhouette. The Aloe Barbadensis Miller has about a 12-year life span.

Studies have found that there are 75 ingredients contained in the Aloe leaf. These ingredients have a variety of medical benefits. They are divided into the following categories:

• **Ligin –** This cellulose substance is found in the gel has no known medical properties except it posses the property of penetrating the human skin.

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• **Saponins** – These form soapy lathers when mixed and agitated with water. They have been used in detergents, foaming agents and contain antiseptic properties.
• **Anthraquinones** – There are 12 of these contained in the sap of Aloe Vera: Aloin, Isobarbaloin, Anthracene, Emodin, Ester of Cinnamonic acid, Chrysophanic acid, Barbaloin, Anthranol, Aloetic acid, Aloe Emodin, Ethereal oil and Resistannol. These act as natural laxatives, painkillers and analgesics, and they contain powerful antibacterial, antifungal and virucidal properties.
• **Minerals** – Aloe Vera contains the following minerals:
- Calcium (essential for proper bone and teeth density)
- Manganese (a component of enzymes necessary for the activation of other enzymes)
- Sodium (ensures that the body fluids do not become too acidic or too alkaline)
- Copper (enables iron to work as oxygen carriers in the red blood cells)
- Magnesium (used by nerves and muscle membranes to help conduct electrical impulses)
- Potassium (regulates the acidic or alkaline levels of body fluid)
- Zinc (contributes to the metabolism of proteins, carbohydrates and fats)
- Chromium (necessary for the proper function of insulin, which in turn controls the sugar levels in the blood)
- Iron (controls the transportation of oxygen around the body via the red blood cells)
• **Vitamins** – Aloe Vera contains numerous vitamins:
- Vitamins A, C, & E (crucial antioxidants that combat dangerous free radicals in the body)
- Vitamin B & Choline (concerned with the production of energy, amino acid metabolism and developing muscle mass)
- Vitamin B12 (responsible for the production of red blood cells)
- Folic acid (helps develop new blood cells)
• **Amino Acids** – Amino Acids are the building blocks of protein, which manufacture and repair muscle tissue. The human body requires 22 amino acids and needs 8 essential ones. Aloe Vera provides 20 of 22 required amino acids and 7 of 8 essential ones.
• **Enzymes** – Some of the most important enzymes in Aloe Vera are: Peroxidase, Aliiase, Catalase, Lipase, Cellulase, Carboxypeptidase, Amylase and Alkaline Phosphatase. Enzymes help to break down food and assist in digestion. Some enzymes help break down fats while others break down starches and sugars.
• **Sugars** – Aloe Vera contains both monosaccharides, such as glucose and fructose, and polysaccharides. Polysaccharides are the most important types of sugars. They aid in proper digestion, maintain cholesterol levels, improve liver functions and promote the strengthening of bones.
• **Sterols** – Sterols are important anti-inflammatory agents. The ones found in Aloe Vera are: Cholesterol, Sitosterol, Campesterol and Lupeol. These sterols contain antiseptic and analgesic properties. They also have pain killing properties similar to aspirin. As Aloe Vera is comprised of approximately 99% water, all of these chemicals are contained in the remaining 1% of the plant. Although this may seem like a small percentage to contain so many ingredients, its helpfulness has been proven to be significant. Dr. Atherton claims that this is due to synergistic actions. He writes, "Synergism is defined as, 'the working together of two or more drugs, muscles, etc., to produce an effect greater then the sum of their individual effects.'" Aloe Vera has the ability to provide essential nutrients, kill bacteria, viruses, fungi, yeasts and reduce inflammation. Dr. Atherton claims, "Tissues that die and are renewed rapidly such as the lining of the gut, which renews itself about every four days, and the skin every 21 to 28 days or so, need a rich and ready supply of building materials to produce and maintain healthy, efficient cells." A proper diet supplemented with Aloe Vera is an effective way to get these essential nutrients. Aloe Vera can also reduce inflammation to injured tissue. Inflammation occurs when healthy tissue is injured and blood begins to clot around the tissue to repair the injured tissue. Aloe Vera is a natural anti-inflammatory that is much

more delicate on the human body. The benefits of Aloe Vera have long been tested throughout history. It is only in recent years that studies have scientifically proven many of the medicinal benefits of Aloe Vera. Perhaps the longer that scientist and botanists study the benefits of Aloe Vera, the more improvements it will create to human health and well-being.

History - Internal Uses Of Aloe Vera

Historical evidence encompassing more than 4,000 years testifies to the high regard of ancient peoples to the benefits of Aloe vera. In the 1930's, interest in the internal gel was enhanced when the material was found to be remarkably effective in treating radiation-induced dermatitis. Since that time, a number of external and internal uses for the internal gel of Aloe have been reported in the literature, some of which are truly remarkable. Owing to increasing anecdotal reports purporting to corroborate beneficial effects of drinking the ground, preserved, internal gel of Aloe, a number of scientific investigations have been undertaken to evaluate the validity of the anecdotal reports. A few of the scientifically documented beneficial uses of drinking Aloe beverages will be delineated in Contradistinction.

Gastrointestinal Disorder

For over 300 years the curanderos and curanderas in the Rio Grande Valley of Texas and the northern states of Mexico have recommended internal Aloe gel for "Las enferemedades del estomago y los intestinos, pero especialment para las ulceras." (The diseases of the stomach and intestines, but especially for ulcers.) As a result of these anecdotal reports, scientific investigations have been undertaken in animal models (laboratory rats) which have shown that if Aloe gel is administered prior to the ulcer-inducing stress (immobilization), there is an 80% decrease in the number of ulcers formed compared with the control animals given saline instead of the Aloe gel. Similarly, if the Aloe gel was given after the ulcers were formed, healing was three times as fast compared to the healing in the control animals. (Galal et al, 1975). In a second laboratory investigation, Aloe gel pretreatment was 85% effective in preventing stomach lesions, and 50% better than the controls in healing the gastric ulcerations. (Kandil and Gobran, 1979) Additional studies showed that a common group of plant constituents, the triterpenes, including lupeol, possess ulceroprotective activity against the formation of gastric ulcerations in albino rats induced

by immobilization restraint. (Gupta et al, 1981) Other investigations have shown that Aloe gel preparations contain lupeol as well as other triterpenoids. (Suga and Hirata, 1983).
Aloe gel mixed with heavy liquid petrolatum (2:1) was given to 12 patients, 7 males and 5 females, ages 24 to 84 years, with definitive x-ray evidence of duodenal ulcers. All 12 patients showed complete recovery with no recurrence for at least a year after ulcer healing. This study suffers, however, from the fact that (1) Duodenal ulcers are often self-healing without any treatment, and (2) There was no control group of patients treated in a similar manner without the administration of Aloe. Nonetheless, the physicians who conducted the study represent trained, clinically-experienced observers, and thus even these uncontrolled observations have some scientific merit. (Blitz et al, 1963).

Anti-Cancer Actions
One of the common experimental cancer models is sarcoma-180. When Aloe was administered to mice bearing S-180 tumors, the tumor growth was inhibited. (Soeda, 1969; Suzuki, 1979)
Similarly, Alexin B, a specific molecule species derived from Aloe, was shown to possess anti cancer activity against lymphocytic leukemia. (Suzuki, 1979a) Additional investigations revealed that another molecular species derived from Aloe, Aloctin-A, had anti-tumor activity, but the action was to bolster the immune system rather than a direct anti-tumor activity. (Imanishi et al, 1981).

Immune System
There are several mechanisms which contribute to the immunological protection enjoyed by normal persons. Among these mechanisms the ingestion of bacteria and other potentially harmful agents by certain white blood cells (a process termed phagocytosis) and the formation of antibodies (formed by another group of white cells, the beta-lymphocytes) are probably the most important. Scientific evidence suggests that Aloe gel contains substances which are active both in stimulating phagocytosis as well as stimulating the formation of antibodies. In one study, the Aloe fractions were shown to increase phagocytosis when injected into guinea pigs. (Stepanava et al, 1977) In another study, mice were injected intraperitoneally with Escherichia coli, which caused a serious infection to develop in the abdominal cavity, namely, peritonitis. Injects of materials from two species of Aloe (Aloe barteri and Aloe ferox) both stimulated phagocytic activity in the animals(Delaveau et al, 1980). It was demonstrated that phagocytic activity was depressed in adult patients with bronchial asthma. A mixture of amino acids derived from Aloe enhanced the depressed phagocytic function of the white blood cells in these asthma patients. (Yagi et al, 1987). In an additional study when certain materials (lectins) purified from Aloe were added to human lymphocytes raised in tissue cultures, the human white cells were stimulated to produce antibodies. (Suzuki et al, 1979). Perhaps the most remarkable studies concern the effect of Aloe fractions on the status of patients with HIV which causes AIDS. The polysaccharide fraction of Aloe was shown to exhibit antiviral activity and enhance cell function. The polysaccharide was given orally, 250 milligrams four times a day, to 8 patients with ARC (AIDS Related Complex), with Walter Reed staging from 3 to 6. Eight of eight patients showed improvement within 90 days of therapy with an average reduction of 2 Walter Reed stages. Fever and night sweats were eliminated in all patients; diarrhea was alleviated in two of three patients, and opportunistic infections (which are usually responsible for the death of the AIDS patient) were controlled or eliminated in six of eight patients. Two patients, unemployable because of the intensity of their symptoms, returned to full employment. Three of three patients showed a decline in HIV core antigen (P-24). Initially positive HIV cultures became negative in three patients. Clinical toxicity and side-effects were entirely absent. Acute toxicity studies in animals showed no toxicity whatever at dosages 100 times those used in the pilot human experiments. (McDaniel and McAnalley, 1988) These experiments however, were uncontrolled, and additional studies, utilizing

appropriate scientific study design would need to be done before the data would be acceptable to the scientific community.

Atherosclerosis And Coronary Heart Disease

Coronary heart disease associated with the accumulation of blood fats (Lipids) in the lining of the arteries is still one of the major causes of death in the Western world. Several studies in animal models as well as in human subjects have suggested that the ingestion of Aloe gel may have a beneficial effect by lowering serum cholesterol, serum triglycerides, and serum phospholipids, which, when elevated, seem to accelerate the deposition of fatty materials in the large and medium-sized arteries, including the coronary arteries of the heart. In one study, albino laboratory rats were fed high cholesterol diets with the experimental group fed the polysaccharide (Glucomannan) from Aloe. Compared with the control animals, the group fed the Aloe fraction showed:

1. Decreased total cholesterol levels.
2. Decreased triglyceride levels.
3. Decreased phospholipid levels.
4. Decreased nonesterified fatty acid levels.
5. Increased HDL cholesterol (the “good” cholesterol) levels.
6. Markedly increased HDL/Total cholesterol ratios.

References

Atherton, P. (1997). The Essential Aloe Vera. Newport Pagnell: Mill Enterprises.

Al Awadi FM: Studies on the activity of individual plants of anantidiabetic plant mixture. Acta Diabetol Lab. 24:1:37-41, Jan-Mar. 1987.

American Osteopathic Association 62:731-735, 1963.

American Podiatric Medical Assn. 79:8:395-397, Aug. 1989.

Bacteriostatic property of Aloe vera.: Journal of Pharmaceutical Science 53:1287, 1964.

Bruce WGG: Investigations of the antibacterial activity in the Aloe. South African Medical Journal 41:984, 1967.

Cole HN; Chen KK: Aloe vera in Oriental dermatology. Archives of Dermatology and Syphilology 47:250, 1943.

Dixit VP: Effects of Aloe barbadensis and clofibrate on serum lipids in tritoninduced hyperlipidemia in presbyter entellus rnonkeys. Indian Journal of Medical Research 78:417-421, 1983.

El Zawahry M; Hegazy MR; Helal M: Use of Aloe in treating leg ulcers and dermatoses. International Journal of Dermatology 12:68-73, 1973.

Faculty of Baylor University in partial fulfillment of the requirements for the Degree of Master of Sciences).

Fan YS, et. al.: Protective effect of extracts from Aloe vera L. var. chinensis on experimental hepatic lesions and a primary clinical study on the injection of in-patients with hepatitis. Chung Kuo Chung Yao Tsa Chih 14:12:746-748, Dec. 1989.

gel on tissue culture cells. Oral Surgery, Oral Medicine & Oral Pathology 27:122-128, 1969.
Ghannam M; Kingston M: Antidiabetic activity of Aloes preliminary clinical and experimental observations. Horm. Res. 24:4:288-294, 1986.

Gjerstad G; Riner TD: Current status of Aloe as a cure all. American Journal of Pharmacy 140:58-64, 1968.

Gribel NV; Pashinski VG: Antimetastatic' properties of Aloe juice. Vopr Onkol 32:12:38-40, 1986 (Russia).

High energy electron injury. Annals of Surgery 162:3:435, 1962.

Kameyama S; Shinho M: Wound healing compositions from Aloe arborescens extracts. Japanese patent 79,151,113. Chemical Abstracts 93:10375y, 1980.

Kandel A; Gbran W: Protection of gastric mucosa by Aloe vera. Journal of Drug Research 11:191-196, 1979 (Egypt).

lesions (use of Aloe vera). Cancer Journal for Clinicians 14:14-15, 1963.
Loveman AB: Leaf of Aloe vera in treatment of Roentgen ray ulcers. Archives of Dermatology and Syphilology 36:838-843, 1937.

McAnalley BW, PhD., et. al.: Demonstration of in-vitro antiviral action of Acemannan against multiple viruses including the HIV virus. Presented at IV International Conference on AIDS (Stockholm, Sweden, June 1988).

Meadows TP: Aloe as a humectant in new skin preparations. Cosmetics and Toiletries 95:51-56, 1980.
Winters WD; Benavides R; Clouse WJ: Effects of Aloe extracts on human normal and tumor cells in vitro. Economic Botany 35:89-95, 1981.

Nikolaeva VG: Plants used by people of the USSR for treatment of infected wounds. Farmatsiya 28:46 49, 1979 (Moscow).

Northway RB: Experimental use of Aloe vera extract in clinical practice. Veterinary Medicine/Small Animal Clinician 70:89, 1975.

Payne JM (1970): Tissue responses to Aloe vera gel following periodontal surgery. (Thesis submitted to
Perry SY, M.D., et. al.: Decreased mortality of normal murine sarcoma in mice treated with the immunomodulator, Acernannan. Molecular Biotherapeutics 3:79-87, June 1991.

Podiatric Medical Assn. 79:11:559-562, Nov. 1989.

presbyter entellus rnonkeys. Indian Journal of Medical Research 78:417-421, 1983.

Pulse TL; Uhlig, Elizabeth: A significant improvement in a clinical pilot study utilizing nutritional supplements, essential fatty acids and stabilized Aloe vera juice in 29 HIV seropositive, ARC and AIDS patients. Journal of Advancement in Medicine 3:4, Winter 1990.

Rovatti B; Brennan RJ: Experimental thermal burns - a comparative study of the immediate and elayed histopathological changes in the skin in untreated and treated thermal burns. Industrial Medicine and Surgery 28:8:364-368, Aug., 1959.

Sato Y: Protection effects of Aloe arborescens on skin injury by X-irradiation. Yakmgakn Zasshi 110:11:876-884, Nov. 1990 (Japan).

Sheets, Mark, D.V.M., et al.: Studies on the effect of Acemannan on retrovirus infections: clinical stabilization of feline leukemia virus-infected cats. Molecular Biotherapy 3:41-45, Mar. 1991.

Soeda M: Studies on the anti-tumor activity of Cape Aloe. Journal of the Medical Society of Toho University 16:365-369, 1969 (Japan).

Soeda M; Fujiwara M; Otomo M: Studies on the effect of Cape Aloe for irradiation leukopenia. Nippon Acta Radiologica 24:1109-1112, 1964.

Soeda M; Otomo M; Ome M; Kawashima K: Studies on antibacterial and antifungal activity of Cape Aloe. Nippon Saikingaku Zasshi 21:609-614, 1966.

Sotnikovg EP: Therapeutic use of Aloe in experimental stomach ulcers (Lechebnoe primenie Aloe prieksperimental). 'Nych Igzvakh Zhelukka Vrach Deb 6:71-74, June 1984 (Russia).

Wright CS: Aloe vera in the treatment of Roentgen ulcers and telangiectasis. Journal of the American Medical Association l06:1363-1364, 1936.

Yahgi A, et. al.: Antibradykinin active material in Aloe saponaria. Journal of Pharmaceutical Sciences 71:1172-1174, 1982.