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Full length Research Paper

Aloe vera for human nutrition, health and cosmetic use -A review

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***Aloe vera* is a wonder plant with numerous health benefits. It acts as a natural fighter against all sorts of infection, an efficient anti-oxidant, helps in treating all digestion related problems, heartburn, arthritis, stress, diabetes, rheumatic pain, asthma, cancer and AIDS. It also acts as a laxative, beauty enhancer and has an effect on lowering blood sugar levels in diabetics. When taken internally works on congestion, intestinal worms, indigestion, stomach ulcers, colitis, hemorrhoids, liver problems such as cirrhosis and hepatitis, kidney infections, urinary tract infections, prostate problems and acts as a general detoxifier. Aloe has been proved to be a plant of amazing medicinal properties by researchers. The medicinal value of the plant is in its gel like pulp obtained by peeling its leaves which has been recognized since centuries. Its juice has cooling properties, is anabolic in action, a fighter of 'pitta', storehouse of phytochemicals and guards against fever, skin diseases, burns, ulcers, boils eruptions etc. Commercially, Aloe can be found in pills, sprays, ointments, lotions, liquids, drinks, jellies, and creams, to name a few of the thousands of products available. In the present scenario, the Aloe industry is blooming but the consumers are misguided leading to unfavourable outcome. So, there is an urgent need to educate about the importance of Aloe vera for human race and popularize it for greater interest.**

Keywords: Aloe vera, medicinal properties, phytochemicals

INTRODUCTION

Aloe vera is a hardy, perennial, tropical, drought-resistant, succulent plant belonging to the Liliaceae family which, historically has been used for a variety of medicinal purposes.

It has a vast traditional role in indigenious system of medicine like Ayurveda, Siddha, Unani and homeopathy. Clinical evaluations have revealed that the pharmacological active ingredients are concentrated in both the gel and rind of the *Aloe vera* leaves. *Aloe vera* is popularly known as *Aloe barbadensis* by taxonomists. It is being used since 1750 BC by Mesopotamians and Egyptians (Shelton, 1991). The word "Aloe" derived from the Arabic word "Alloeh" which means shining and bitter substance (Tyler *et al.,* 1976). The virtues of *Aloe vera* have been recorded for thousands of years by many ancient civilizations including Egypt, Persia, Greek, India and Africa (Rolf and Zimmerli, 2000). The genus is indigenous to African continent and Mediterranean countries, such as Greece and Southern Italy. It is reported that it grows wild on the islands of Cyprus, Malta, Sicily, Canary Cape, Cape Verde and have spread over arid tracts of India. Out of the 275 species, 42 of them belong to Madagascar region (Africa), 12-15 to Arabian Peninsula and rest are distributed over tropical South Africa. In India, only 4 species (*Aloe forbesii*, *Aloe inermis*, *Aloe ferox* and *Aloe barbadensis*) are reported to occur and of these *Aloe barbadensis* is the most widely distributed species. These taxa comprises of several varieties, viz., *officinalis, chinensis, litoralis* and their cross. The species has a number of synonyms: *A. barbadensis* Mill., *Aloe indica* Royle, *Aloe perfoliata* L. var. *vera* and *A. vulgaris* Lam., (Anonymous, 2008a; Anonymous, 2008b) and common names including Chinese Aloe, Indian Aloe, True Aloe, Barbados Aloe,

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Burn Aloe, First Aid Plant, Wand of Heaven and Miracle Plant (Jamir et al., 1999; Barcroft and Myskja, 2003; Liao et al., 2004; Ombrello, 2008). The species name *vera* means "true" or "genuine" (Ombrello, 2008). Some literature identifies the white spotted form of *Aloe vera* as *Aloe vera* var. *chinensis*, (Gao and Xiao, 1997; Wang et al., 2004) however, the species varies widely with regard to leaf spots (Akinyele and Odiyi, 2007) and it has been suggested that the spotted form of *Aloe vera* may be similar to *A. massawana* (Lyons, 2008). The species was introduced to China and various parts of southern Europe in the 17th century (Farooqi and Sreeramu, 2001).

Nutritional properties

An analysis of *Aloe vera* reveals some magic behind its miraculous healing powers. The plant contains a multitude of essential vitamins and minerals such as: vitamins A, B_1, B_2, B_3, B_6, B_{12}, C, E, folic acid, choline, calcium, phosphorous, potassium, iron, sodium, magnesium, manganese, copper, chromium, and zinc. Aloe also contains a wealth of amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, valine, aspartic acid, glutamic acid, alanine, arginine, cystine, glycine, histidine, hydroxyproline, proline, serine, and tyrosine (John Waller et al., 1980). Free monosaccharides consisted of D-mannose and D-glucose in a molar ratio of 5:4 and trace amounts of xylose, rhamnose, galactose and either arabinose or fucose. Mannose 6 phosphate is a major sugar component in *Aloe vera* (Joseph and Justin, 2010). *Aloe vera* contains 75 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids (Atherton, 1998). Additional minerals found in *Aloe vera* include copper (important for red blood cells, skin and hair pigment), iron (involved in oxygen transportation and making of hemoglobin in red blood cells), potassium (helps in fluid balance), phosphorus (helps in building bones and teeth, assists in metabolism and maintains body pH) and sodium (regulates body liquids, helps in nerve and muscle performance, and helps in delivering nutrients to body cells) (Barcroft 1999). *Aloe vera* also contains the trace minerals rhodium and iridium used in cancer and tumor research experiments (Barcroft). Another component of *Aloe vera* consists of the lignins, a major structural material of cellulose content that is helpful for penetrative properties and beneficial for skin problems such as eczema and psoriasis.

Phyto-chemical properties

The Aloe plant contains flavonoids, terpenoids, lectins (Eshun and He, 2004; Boudreu and Beland, 2006), fatty acids, cholesterol, anthraquinones, chromones (8-*C*-glucosyl-7-*O*-methylAloediol, 8-*C*-glucosyl-noreugenin, isoAloeresin-D, iso-rabaichromone, neoAloesin-A) (Dagne *et al.,* 2000; Ni and Tizard, 2004) mono and polysaccharides (pectins, hemicelluloses, glucomannan, acemannan and mannose derivatives) (Femenia et al., 1999; Choi and Chung, 2003), tannins, sterols (lupeol, campesterol and β - sitosterol), salicylic acid, organic acids, enzymes, saponins, vitamins, minerals (Newall et al, 1996a), aloin, Aloe emodin (3-hydroxylmethyl-chrysazin), Aloetinic acid, choline and choline salicylate, complex mucopolysaccharides similar to hyaluronic acid, sapogenins and enzymes such as catalase, amylase, cellulase and alliinase. *Aloe vera* leaves contain a range of biologically active compounds, the best-studied being acetylated mannans, polymannans, anthraquinone C-glycosides, anthrones and anthraquinones, and various lectins (King et al., 1995; Eshun and He, 2004; Boudreau and Beland, 2006). The ten main areas of chemical constituents of *Aloe vera* include: amino acids, anthraquinones, enzymes, minerals, vitamins, lignins, monosaccharide, polysaccharides, salicylic acid, saponins, and sterols (Barcroft 1999). It is also reported that the main enzymes found in *Aloe vera* include amylase (breaks down sugars and starches), bradykinase (stimulates immune system, analgesic, anti-inflammatory), catalase (prevents accumulation of water in the body), cellulase (aids cellulose digestion), lipase (aids fat digestion), oxidase, alkaline phosphatase, proteolytiase (hydrolyses proteins into their constituent elements), creatine phosphokinase (aids metabolism), and carboxypeptidase (Zhang and Tizard, 1996; Barcroft 1999). Other constituents of *Aloe vera* would include prostaglandins, tannins, magnesium lactate, resins, mannins and proteins such as lectins, monosulfonic acid and gibberellins (Barcroft, 1999).

Chemical composition and properties of *Aloe vera* (Rodríguez et al., 2005)

Medicinal properties

Aloe vera has been used for medicinal purposes in several cultures for millennia: Greece, Egypt, India, Mexico, Japan, and China (Marshall, 1990). The Egyptians used the *Aloe vera* to make papyrus like scrolls as well as for treatment of tuberculosis (Baker, 1975). Nadkerni (1976) also stated various preparations of *Aloe barbadensis* like confection, lotion and juice, useful remedies for curing various diseases. Aloe contains mixture of glucosides collectively called 'aloin' which is the active constituent of various drugs. Indian Aloe (*Aloe barbadensis*) is a rich source of over 200 naturally occurring nutrients such as vitamins, minerals,

Table 1. Chemical composition and properties of *Aloe vera*

Constituents	Number and identification	Properties and activity
Amino acids	Provides 20 of the 22 required amino acids and 7 of the 8 essential ones.	Basic building blocks of proteins in the body and muscle tissues.
Anthraquinones	Provides Aloe emodin, Aloetic acid, alovin, anthracine	Analgesic, antibacterial
Enzymes	Anthranol, barbaloin, chrysophanic acid, smodin, ethereal oil, ester of cinnamonic acid, isobarbaloin, resistannol	Antifungal & antiviral activity but toxic at high concentrations.
Hormones	Auxins and gibberellins	Wound healing and anti-inflammatory.
Minerals	Calcium, chromium, copper, iron, manganese, potassium, sodium and zinc.	Essential for good health.
Salicyclic acid	Aspirin like compounds	Analgesic
Saponins	Glycosides	Cleansing & antiseptic
Steroids	Cholesterol, campesterol, lupeol, sistosterol	Anti-inflammatory agents, lupeol has antiseptic and analgesic properties.
Sugars	Monosaccharides: Glucose and Fructose Polysaccharides: Glucomannans/polymannose	Anti-viral, immune modulating activity of acemannan
Vitamins	A, B, C, E, choline, B_{12}, folic acid	Antioxidant (A,C,E) ,neutralises free radicals

sugars, amino acids, enzymes and acids, which helps in digestion. The products prepared from Aloe leaves have multiple properties such as emollient, purgative, antibacterial, antioxidant, antifungal, antiseptic and cosmetic. The Food and Drug Administration of the USA has approved the developmental study of *Aloe vera* for the treatment of cancer and AIDS. This is attributed to the antiviral and immune modulating properties of acemannan. Traditionally Aloe is extensively used in treating urine related problems, pimples and ulcers etc. It is also used in gerontology and rejuvenation of aging skin. The juice of *Aloe vera* leaves is used as stomachic tonic and purgative. Scientific evidence for the cosmetic and therapeutic effectiveness of *Aloe vera* is limited and when present is frequently contradictory (Ernst, 2000; Marshall, 2000). Despite this, the cosmetic and alternative medicine industries regularly make claims regarding the soothing, moisturizing, and healing properties of *Aloe vera*, especially *via* internet advertising (Kunkel, 1984; Boudreau and Beland, 2006). The bioactive compounds are used as astringent, haemostatic, antidiabetic, antiulcer, antiseptic, antibacterial, anti inflammatory, antioxidant and anticancer agent also, effective in treating stomach ailments, gastrointestinal problems, skin diseases, constipation, radiation injury, wound healing, burns, dysentery, diarrhoea and in the treatment of skin diseases. (Rabe and Staden, 1997). Currently, the plant is widely used in skin care, cosmetics and as nutraceuticals (Gordon and David, 2001). It is used in ayurvedic formulations as appetite-stimulant, purgative, emmenogogue and antihelminthic, for treating cough, colds, piles, debility, dyspnoea, asthma and jaundice (Joseph and Justin, 2010). Co-treatment with *Aloe vera* was effective in reducing genotoxicity of the direct-acting mutagen (Snezana Stanic, 2007). *Aloe vera* contains salicylic acid which is an aspirin-like compound with anti-inflammatory, analgesic and anti-bacterial properties. It has anti-pyretic properties for reducing fevers.

The plant steroids have fatty acids in them that have antiseptic, analgesic, and anti-inflammatory properties (Urch and David, 1999). *Aloe vera* contains properties such as: astringent, emollient, antifungal, and cell proliferant used to heal wounds and burns (Balch and James, 2000). Generally, Aloe juice is a good tonic for skin and digestive disorders (Balch and James, 2000). The enzymes in *Aloe vera* will improve digestion and nutrient absorption. It will help bring the body to a pH balance while being beneficial to the whole gastro-intestinal system. *Aloe vera* relieves digestive system disorders such as Acid Indigestion, IBS (Irritable Bowel Syndrome), Colitis, and stomach acidity (Barcroft 1999). *Aloe vera* juice aids the digestion and absorption of nutrients, helps control blood sugar, increases energy production, promotes cardiovascular health, improves liver function, and boosts the immune system. The pulp is used extensively in Siddha medicines for treating constipation, enlargement of spleen, zymotic disease and chengamaari (a type of venereal infection) (Raamachandra, 2001). The plant was more active as a gastroprotective agent at lower concentration against mucosal injury induced by 0.6 M HCL (Sadiq et al.,

2004).

Antimicrobial activity

Aloe vera was evaluated on the mycellium development of *Rhizoctonia solani*, *Fusarium oxysporum*, and *Colletotrichum coccodes,* that showed an inhibitory effect of the pulp of *A. vera* on *F. oxysporum* at 104 µl l−1 and the liquid fraction reduced the rate of colony growth at a concentration of 105 µl 1−1 in *R. solani*, *F. oxysporum*, and *C. coccodes* (Cheesbrough, 1984; D.Jasso de *et al.,* 2005). It is also reported that the Aloe juice have anti-inflammatory, anti-arthritic activity, antibacterial and hypoglycaemic effects (Newall et al., 1996b). For bacteria, inner-leaf gel from *Aloe vera* was shown to inhibit growth of *Streptococcus* and *Shigella* species in vitro (Ferro et al., 2003). Agarry et al., 2005 reported that the Aloe gel inhibited the growth of *Trichophyton mentagrophytes* (20.0 mm), while the leaf possesses inhibitory effects on both *Pseudomonas aeruginosa* and *Candida albicans*. In contrast, *Aloe vera* extracts failed to show antibiotic properties against *Xanthomonas species* (Satish et al., 1999). Other uses for extracts of *Aloe vera* include the dilution of semen for the artificial fertilization of sheep (Rodriguez et al., 1988), used as fresh food preservative (Serrano et al., 2006) and used in water conservation in small farms (Anonymous, 2008c). Another constituent of *Aloe vera* includes saponins. These are soapy substances from the gel that are capable of cleansing and having antiseptic properties. The saponins perform strongly as anti-microbial against bacteria, viruses, fungi and yeasts (Atherton and Peter, 2002) .The plant sterols or phyto-steroids in *Aloe vera* include cholesterol, campesterol, lupeol, and β-sitosterol.

Digestive system health

Aloe vera juice is useful to treat gastric intestinal problems like indigestion, candida, colitis and relief from digestive issues such as heartburn and irritable bowel syndrome, although it bears significant potential to be toxic when taken orally (Anonymous, 2007). Constipation, diarrhea, indigestion, irritable bowel syndrome etc. are cured by the flushing action of *Aloe vera* juice. The deposits of toxins and un-wanted substances in our diet keeps on accumulating in intestine and prevent the absorption of essential nutrients causing nutritional deficiency, lethargy, constipation, and low back ache. Aloe juice helps to flush out these residues boosting the digestion and gives a greater feeling of well being. *A. vera* gel and leaf is used to relieve many types of gastrointestinal irritations (Grindlay and Reynadds, 1986; Foster, 1999). Preliminary studies have suggested oral *Aloe vera* gel may reduce symptoms and inflammation in patients with ulcerative colitis (Langmead et al., 2004a). The anti-inflammatory actions of *Aloe vera* gel *in vitro* provide support for the effect in inflammatory bowel disease (Langmead *et al.,* 2004b). The peeled, fresh and preserved gel is used to treat inflamed eyes and skin inflammations of sores and burns. The healing properties of Aloe are due to the presence of aloectin B, which stimulates the immune system. As a drink it protects the mucous membrane of the stomach especially when irritated or damaged. *A. vera* juice is considered helpful for relieving many types of gastrointestinal irritation and juice products are widely available (Foster, 1999). *Aloe vera* acts against various micro-organisms and increases total white blood cell count and macrophages. In acute gastric mucosal lesions, the extract dose dependently inhibits gastric acid secretion and provides gastro protective activity (Joseph and Justin, 2010).

Wounds healing

Wound healing is a dynamic process, occurring in 3 phases. The first phase is inflammation, hyperaemia and leukocyte infiltration. The second phase consists of removal of dead tissue. The third phase of proliferation consisting of epithelial regeneration and formation of fibrous tissue (Reddy *et al.,* 2011). *Aloe vera* is often called the “Natural healer”. Aloe gel is excellent for healing first degree burns, relieves inflammation and accelerates healing. The Aloe gel stimulates cell division due to presence of wound healing hormones. *Aloe vera* gel has antibacterial, antifungal, antiviral and antiseptic properties and helps to heal minor wounds. *Aloe vera* juice when taken orally enhances immunity and increases cell repair capacity by inhibiting infestation of micro-organisms. It reduces painful effects of shingles, reduces symptoms of psoriasis and eases heartburns and ulcers. *Aloe vera* has high water content (96%). This prevents wound desiccation and increases migration of epithelial cells (Mortan, 1961). The microcirculation of wound is enhanced by Aloe, through increasing oxygenation. The catecholamines have wound retardant effect. Aloe blocks action of catecholamines, thus increases epithelisation (Rubin, 1984). *Aloe vera* increases vascularisation of the wound, which removes the dead tissue and makes wound healthy (Davis *et al.,* 1989). Aloe may also increase cross linking of collagen and collagenisation by stimulating macrophage cytokine production and acemmannan acts as a macrophage stimulator (Zhang and Tizard, 1996). *Aloe vera* may also block some wound healing inhibitors like sterols and amino acids through the growth factors present in it (Davis et al., 1989). The ascorbic acid in *Aloe vera* enhances the synthesis of collagen and counter balances collagen breakdown (Stone and Meistar, 1965). Further studies have shown that *Aloe vera* is used for treatment of herpes simplex infection, lichen planes, gingivitis (Hayes, 1999; Leigh,

2005; Wynn, 2005). The healing effect of Aloe results from its ability to prevent injury to epithelial tissues, and promote healing of injured tissues (Joseph and Justin, 2010). Aloe products like *Aloe vera* juice, jelly, pickle, sharbat, gel, glycerin, body lotion, shampoo, fairness cream, hair gel, pimple gel etc can be used for skin treatments.

Aloe gel is perhaps the most widely recognized herbal remedy in the United States today; it is used to relieve thermal burn, sunburn and promote wound healing (Foster, 1999). It is also effective in wound healing due to the presence of some components like anthraquinones and hormones (Davis, et al., 1989; Davis, 1997; Vogler and Ernst, 1999), which posses antibacterial, antifungal and antiviral activities. Evidence of the effects of its sap on wound healing, however, is limited and contradictory (Vogler and Ernst, 1999). Some studies, for example, show that *Aloe vera* promotes the rates of healing (Davis et al., 1989; Heggers et al., 1997), while, in contrast, other studies show that wounds to which *Aloe vera* gel was applied were significantly slower to heal than those treated with conventional medical preparations (Schmidt and Greenspoon, 1991). A more recent review concludes that the cumulative evidence supports the use of *Aloe vera* for the healing of first to second degree burns (Maenthaisong et al., 2007) and helps to remove skin disorders of all kinds (Duke and James, 2000) due to antibacterial, antiviral, and analgesic properties (Atherton and Peter, 2002). The anthraquinones in *Aloe vera* breakup residue, pus and lifeless cells, bring blood to the region and flush out material from the wounds and ulcers (Atherton and Peter, 2002). It is also used in variety of skin ailments such as mild cuts, insect stings, bruises, poison ivy and eczema. It has antibacterial and antifungal qualities, and increases blood flow to wounded areas. It stimulates fibroblasts, the skin cells responsible for wound healing and the manufacture of collagen, the protein that controls the aging process of the skin and wrinkling (Joseph and Justin, 2010). *Aloe vera* is now widely used on face tissues, where it is promoted as a moisturizer and anti-irritant to reduce chafing of the nose of users who suffer hay fever or cold (Anonymous, 2009).

Human immune system

Aloe vera helps to improve immunity and protects heart, brain and other vital organs of body. The whole leaf extract galvanizes the cells of immune system. The phagocytes of human body increase their scavenging activities, thus cleaning the body and giving a whole cascade of protective actions, which strengthen immunity. *Aloe vera*, a great immune stimulant, contains 90 per cent rhodium and iridium (trace minerals) in the acemannan which is one of the polysaccharides which dramatically increases the white blood cells or macrophages and T cells (Rabe and Staden, 1997; Barcroft 1999; Balch and James, 2000; Joseph and Justin, 2010). The most important are the long chain polysaccharides, comprising glucose and mannose, known as the gluco-mannans. The polysaccharides are absorbed completely and appear in the blood stream unchanged hence they act as immunomodulators (Sheets *et al*., 1991; Green, 1996). The bitter Aloes consist of free anthraquinones and their derivative: barbaloin, Aloe-emodin-9-anthrone, isobarbaloin, anthrone-*C*-glycosides and chromones. In large amounts these compounds exert a powerful purgative effect, but when taken in smaller amounts they appear to aid absorption from the gut, are potent antimicrobial agents (Lorenzetti, 1964; Sims and Zimmerman, 1971) and possess powerful analgesic effects. They also reduce the formation of melanin and any tendency to hyper-pigmentation (Mckeown, 1987; Faith *et al.,* 1993). Lignin with their penetrative ability fecilitate to carry other active ingredients deep into the skin to nourish the dermis (Coats, 1979). *Aloe vera* extracts when consumed (150 mg/kg or 300 mg/kg) for 5 days, there was a significant increase in the total white blood cell count and macrophages. This shows the immunomodulatory property of the extract (Jyotsana et al., 2008).

Davis (1997) saw a promising role of this natural broad spectrum healing plant because of its immunodulatory properties and can also act as an immune stimulant. Acemannan, a chemical compound found in *Aloe vera* acts as a powerful immunostimulant in animals, particularly in cats (Gregory, 2001). *Aloe vera*, an anti-oxidant rich plant, contains vitamins such as A, C and E acting as natural antioxidant alongwith the minerals zinc and selenium. Anti-oxidants help boost the immune system and combat free radicals in the body. These free radical fighters get rid of the toxins and carcinogenic elements in human bodies from the pollution and poor quality foods (Barcroft 1999). The *Aloe vera* gel polysaccharide can boost the working of the macrophages in the intestines allowing the immune system to improve the activity of T-Lymphocytes by up to 50 per cent for penetrating the bad bacteria, viruses, tumor cells and various pathogens (Cheesbrough 1984; Barcroft 1999; Colman and Robert, 2000).

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 antiinflammatory 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 adjutant arthritis (Rabe and Staden, 1997; Barcroft 1999; Balch and James, 2000; Joseph and Justin, 2010).

Stress

Aloe juice is helpful in smooth functioning of the body machinery (Saroj et al., 2004). It reduces cell-damaging process during stress condition and minimizes biochemical and physiological changes in the body (Joseph and Justin, 2010). Oxidative stress refers to chemical reactions in which compounds have their oxidative state changed. Some antioxidants are part of the body's natural regulating machinery while other dietary antioxidants are derived from diet sources. *Aloe vera* is an excellent example of a functional food that plays a significant role in protection from oxidative stress (Barcroft 1999; Foster, 1999; Joseph and Justin, 2010; El-Shemy, 2010).

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. *Aloe vera* leaf contains anthraquinones, saccharides, vitamin E and C, zinc, enzymes, acetyl salicyclic and others. 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). 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). 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). It lowers glucose and triglycoside levels in diabetic patients. Aloe polysaccharides improve the property of immune cells and are also very effective to eliminate waste and other toxins. *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). *Aloe vera* extracts may be useful in the treatment of wound and burn healing, minor skin infections, sebaceous cyst, diabetes, and elevated blood lipids in humans (Boudreau and Beland, 2006)

Hepatitis

Oral use of Aloe juice helps in recovery of chronic hepatitis patients. Internal intake of *Aloe vera* has been associated with acute hepatitis (Bottenberg et al., 2007). The fresh juice obtained from the cut bases of the leaves is used to treat liver and spleen (Kirtikar and Basu, 1989; Neall, 2004).

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. However, studies suggest that the ingestion of *Aloe vera* gel may have a beneficial effect to the accumulation of blood lipids associated with the disease. Test groups given *Aloe vera* showed a decrease in total cholesterol, triglyceride, phospholipids and nonesterified 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).

AIDS

A daily dose of minimum 1200 mg of active ingredients of *Aloe vera* showed substantial improvement in AIDS symptoms. Its healing powers extend to soothing internal wounds and burns such as the damage done to the internal organs by high-potency drugs of AIDS. *Aloe vera* contains gluco-mannan, a special complex polysaccharide composed largely of the sugar mannose. It interacts with special cell-surface receptors on those cells which repair damaged tissues, called fibroblasts, stimulating them, activating their faster growth and replication. An extract of mannose, one of the sugars in *Aloe vera* can inhibit HIV-1, the virus associated with

AIDS. Researchers found that *Aloe vera* stimulates the body's immune system, particularly T4 helper cells – white blood cells that activate the immune response to infection. Carrington Laboratories in the United States have separated the acemannan from *Aloe vera*. The product is sold as "Carrisyn" and is being used for treatment of AIDS and Feline leukemia. It has antiviral and immunemodulating properties, improves cellular metabolism by normalizing cellular function and regulating the flow of nutrients and wastes in and out of the cells. In some AIDS patients, it even protected the immune system from the toxic side effects of Azidothymidine, the first approved treatment of HIV (Urch and David, 1999).

Beauty care

Aloin and its gel are used as skin tonic against pimples. *Aloe vera* is also used for soothing the skin, and keeping the skin moist to help avoid flaky scalp and skin in harsh and dry weather. It may also be used as a moisturizer for oily skin. *Aloe vera* improves the skin's ability to hydrate itself, aids in the removal of dead skin cells and has an effective penetrating ability that helps transport healthy substances through the skin. Each of these factors makes *Aloe vera* an ideal ingredient in cosmetic and dermatological products. In fact, *Aloe vera* is currently one of the most important ingredients in the cosmetics industry, being utilized in over 95 per cent of the dermatologically valuable extracts manufactured worldwide. The Aloe sugars are also used in moisturizing preparations (Barcroft 1999).Mixed with selected essential oils, it makes an excellent skin smoothening moisturizer, sun block lotion plus a whole range of beauty products. Due to its soothing and cooling qualities, Maharishi Ayurveda recommends *Aloe vera* for a number of skin problems (Joseph and Justin, 2010). *Aloe vera* extracts have antibacterial and antifungal activities, which may help in the treatment of minor skin infections, such as boils and benign skin cysts and have been shown to inhibit the growth of fungi that cause tinea (Shamim et al.,2004).

Commodity use of *Aloe vera*

The leaves of Aloe are eaten as vegetable. Pickle made by small pieces of leaf pod is a common preparation in western Rajasthan (Saroj et al., 2004). The immature flower stalk that are completely free from bitter content, are also used for vegetable purpose. Fresh fleshy leaf pod is a part of green salad and helpful in treatment of indigestion and constipation. Sharma and Goel (2002) standardized the recipes of various Aloe product viz., vegetable, pickles, laddo, jam, squash, biscuits and churna by using sensory evaluation technique. Saroj and Purohit (2004) standardized the recipe for preparation of some culinary products from sweet type Aloe (*Aloe barbadensis*). It helps to cure diabetes, ulcer, heart disease (Choo, 2003). Now a day's *Aloe vera* juice is available in the market to enhance immune response against various diseases. Besides juice, *Aloe vera* leaf powder is also being used by food processing industries in preparation of yoghurt and other food products (Yong Seoshin et al., 1995). The gel is most commonly used part of the plant which has been processed and used in different products. Today, the industry is flourishing and gel is being used as fresh gel juice (Anonymous, 2004). It has also been suggested that bio-fuels could be obtained from *Aloe vera* seeds (Shukla, 2008). It is common practice for cosmetic companies to add sap or other derivatives from *Aloe vera* to products such as makeup items, tissue papers, moisturizers, soaps, sunscreens, incense, shaving cream, and shampoos (Reynolds, 2004). Traditionally, Aloe is extensively used for medicinal purpose particularly for urine related problems, pimples and ulcers. Aloin and its gel are used as skin tonic and have a cooling and moisturizing affects so it is used in preparation of creams, lotions, shampoos and allied products (Singh *et al.,* 1995).

Aloe contents of different market products are about 20% (sunburn treatments, creams and ointments), 95% (juices), 50% (beverages), 10% (drinks), and 5-10% (capsules).

CONCLUSION

Hence there is no wonder in considering Aloe vera as the 'Wonder plant'. It's uses are multiple -from being an antiseptic, anti-inflammatory agent ,a curing agent for heart problems, helps in relieving the symptoms of severe illnesses like cancer and diabetes, being a beauty enhancer and improves health. This Ancient Indian herb has been known from centuries for its unique medicinal properties, but now it has been rediscovered, recognized and is benefiting the people. The active ingredients hidden in its succulent leaves have the power to soothe human life and health in a myriad ways. Aloe vera is undoubtedly, the nature's gift to humanity and it remains for us to introduce it to ourselves and thank the nature for its never-ending gift.

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