



Review on Aloe vera Medicinal plant

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Abstract : The aloe plant is employed as a dietary supplement in a variety of food and as an ingredient in cosmetic products. The widespread human exposure and its potential toxic and carcinogenic activities raise safety concerns. Recently, Aloe vera whole leaf extract showed clear evidence of carcinogenic activity in rats, and was classified by the International Agency for Research on Cancer as a possible human carcinogen (Group 2B). This review presents updated information on the toxicological effects, including the cytotoxicity, genotoxicity, carcinogenicity, and adverse clinical effects of Aloe vera whole leaf extract, gel, and latex. Aloe vera is an herbaceous and perennial plant that belongs to the Liliaceae family and used for many medical purposes. The present study aimed to systematically review clinical trails regarding the effect of Aloe vera on the prevention and healing of skin wounds. The medical value of the plant is recognized since centuries because of the gel like pulp obtained by peeling its leaves. Its juice has cooling properties, is anabolic in action, a fighter of pitta, storehouse of phytochemical and guards against fever, skin diseases, burns, ulcer, 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. It also acts as a laxative beauty enhancer and studies have shown that it has an effect on lowering blood sugar level in diabetics. The main limitation of the current clinical knowledge about aloe vera is small clinical studies that often lack rigorous methodology. Several clinical trails are being conducted to further confirm traditional uses of aloe vera gel for a variety of disorders, as well as to further confirm traditional uses of the plant extract. The external use in cosmetic primarily acts as skin healer and prevents injury of epithelial tissues, cures acne and gives a youthful glow to skin.

IndexTerms - Component,formatting,style,styling,insert.

INTRODUCTION

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 [1]. Aloe vera is a handy ,perennial, tropical, drought –resistant, succulent plant belonging to Liliaceae family which ,historically has been used for a variety of medicinal purposes. It has a vast traditional role in indigenous 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 a stem less or very short –stemmed plant growing to 60-100 cm height, spreading by offsets. Mature plants can be grown as tall as four feet with average height around 26-28 inches. Each plant has 12 to 16 leaves usually and weighs up to 2-3 kg on maturity. The plants can be harvested after every 6 to 8 weeks by removing 3-4 leaves per plant .It produces erect unbranched flowering stalks in the second year in winter seasons, which grows 90-150 cm tall. It bears bright yellow and United States of America, and venezuela [5,6]. Aloe vera is a customary ,dry spell dispute , sticky plant .The aloe name is originate from Arabic “Alloeh” or Hebrew “Halal” means intensely Shiny specialist. It has delivered a substantial conventional part in indigenous arrangement of pharmaceutical framework like Ayurveda, siddha, Unani and homeopathy [7]. Aloe barbadensis mill operate is a semi tropical plant is one of the 250 types of Aloe vera “Ghee kunwar” is most normal for its powerful therapeutic properties, aloe vera its Sanskrit name is an individual from Lilly family. The plant found in spear molded, and sharp pointed, and rugged and edged leaves [8]. Aloe vera is popularly known as Aloe barbadensis by taxonomists. Its being used since 1750 BC by Mesopotamians and Egyptians [9]. The Arabic word alloeh means shining and bitter [10]. The species was introduced to China and various parts of southern Europe in the 17th century 17. The species is widely naturalized elsewhere, occurring in temperate and tropical regions if Australia Barbados, Belize, Nigeria, Paraguay and the US18. Additional minerals found in Aloe vera include copper (important for red blood cell, skin, and hair pigment), iron (involved in oxygen transportation and making of hemoglobin in red blood cell), potassium (helps in fluid balance), phosphorus (help in building bones and teeth, assists in metabolism and maintain body pH) and sodium (regulates body liquids, helps in nerve and muscle performance, and help in delivering nutrients to body cell) [11]. Aloe vera also contains the trace minerals rhodium and iridium used in cancer and tumor research experiments [12]. 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. Aloe vera, an anti-oxidant rich plant, contains vitamins such as A, C and E acting as natural antioxidant along with 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 [13]. The green fleshy leaves range in height from a few centimeters to 2-3 meters or more and have three identifiable layers. The outer layer is a thick cuticle or rind accounting for about 20% -30% by weight of the whole plant leaf. It consists of upto 18 layers of cells interspersed with chloroplasts where carbohydrates, fats, and proteins are synthesized. The outer leaf pulp, a thin, mucilaginous layer just beneath and adjacent to the thick rind, contains vascular bundle acting as the transport system for the plant. Three types of tubular structures compose the vascular bundles; xylem, which moves water and minerals from the root to the leaves; phloem, which takes synthesized minerals to the roots; and the pericyclic tubule, which stores and transports bitter yellow latex (Often referred to as Aloe sap) along the margin of the leaf. The number of these bundles varies based on the size of leaves [14]. Due to the numerous purported beneficial effects, Aloe vera production has been an emerging industry for making laxative drugs, cosmetics, and functional food, such as face and hand creams, foundations, cleansers, lipsticks, suntan lotion, shampoos and hair tonics, shaving preparations, bath aids, makeup and fragrance preparations, baby lotions and wipes, yogurt, drinks, capsules, and tablets. In order to show current pharmacological and /or toxicological research status on Aloe, we performed a literature search in PubMed using “Aloe” and specific country name as key words (Table 1). A total of 1895 and 975 publications were identified when using “Aloe” as key word in All Fields Not Author and MeSH term databases, respectively More than half (51% -60%) of these studies were conducted in the top 10 countries (Table 1) and about one third of them are from five Asian countries, including China, India, Korea, and Iran. However, only about 8% of these articles investigated Aloe – related toxicity in vitro and in vivo (Table 1).

Pharmacological and /or toxicological research on Aloe based on PubMed online search. Pharmacological and/or toxicological research on Aloe based on PubMed online search.*

	Country	All fields [#]	MeSH term
Aloe	All	1895	975
	China	267	76
	India	191	90
	USA	188	95
	Japan	110	61
	South Africa	93	47
	Korea	72	44
	Iran	65	22
	Italy	55	22
	UK	48	21
	Brazil	39	21
Top 10 countries		1128 (60%)	499 (51%)
Toxicity-related		150 (8%)	81 (8%)

Although Aloe vera has long been considered as a safe functional food material that can be used orally and topically, [15] on many occasions it has not been as safe as commonly thought. While such reports are interesting and relevant for formulating hypotheses, controlled trails are essential for defining its effectiveness more conclusively [16]. The juice that is originated from cells of the pericycle and adjacent leaf parenchyma, flowing spontaneously from the cut leaf get dried with or without the aid of heat and get solidified should not be confused with or without the aid of heat and get solidified should not be confused with Aloe vera gel which is also the colourless mucilaginous gel that is obtained from the parenchymatous leaf cell [17]. The parenchymatous tissue or pulp shown to contain proteins, lipids, amino acids, vitamins, enzymes, inorganic compounds and small organic compounds in addition to the different carbohydrates. There is some evidence of chemotaxonomic variation in the polysaccharide composition [18 -19]. The Aloe vera gel play role in stimulation of the complement linked to polysaccharides, hydration, insulation, and protection. Application of fresh gel to normal human cells in vitro promoted cell growth and attachment, whereas a stabilized gel preparation additional substances added to gel during processing [20]. The wound healing powers were due to high molecular weighted polypeptide in healing of rats excision wound [21]. This glycoprotein promotes cell proliferation, so gel improves wound healing by increasing blood supply and increased oxygenation [22]. Growth of new blood capillaries (angiogenesis) and tissue for a guinea pig has been reported, however, no specific constituents were identified [23]. Aloe vera is most regular most established restorative plant ever known as the most helpful therapeutic plantin all over world [24]. About more than 200 mixes are found in Aloe barbadensis and around 75 have natural action and pharmacological exercises are contain in the Aloe vera clear out. It contains different mixes including for example, sugars, proteins, glycoproteins, amino acid natural acids, anthraquinones (e.g aloe – emodin), anthrones and their glycosides anhydroglucosly) aloemodin – 9-anthrone, otherwise called aloin An and B), chromones, lipids sugars, vitamins and minerals [25],[26],[27]. It has been set up that Aloe vera has development advancing exercises of hostile to contagious properties of aloe vera leave are dictated by casian. The concentrates or parts of Aloe vera animate the multiplication of various cell sorts. In Many studies are demonstrated that treatment with Aloe vera gel, removes delivered the outcome in quicker mending of wound[28],[29],[30],[31],[32].



Therapeutic action:

1. Anti-inflammatory action:

Aloevera by inhibiting the cyclooxygenase pathway reduces the production of prostaglandin E2 from arachidonic acid . A novel anti-inflammatory compound called C-glucosyl chromone was also isolated from Aloe gel extracts recently [33]. Langmead et al. [34] reported Anti-inflammatory effects of aloe vera gel in human colorectal mucosa in vitro . Reuter et al. [35] reported the anti-inflammatory potential of aloe vera gel (97.5%) in the ultraviolet erythema test . Lee et al.[36] reported anti-inflammatory activity of aloe vera adventitious root extracts through the alteration of primary and secondary metabolites via salicylic acid elicitation.

2. Anti bacterial anti fungal activities :

Extracts from Aloe vera were found have anti bacterial and anti fungal activities [37],[38],[39],[40],[41]

3. Anti tumour activity:

Different glycoproteins are available in Aloe vera . The counter tumor and antiulcer affrcs and to build expansion of ordinary human dermal cells .[42] in late studies , polysaccharide divisin has appeared to repress the authoritative of benzopyrene to essential rodent hepatocytes , in this manner keeping the arrangement of possibly disease starting benzopyrene – DNA adducts in the provoking of glutathione s – transferase and an impendiment of the tumor promating effect of phorbol myristic acidic corrosive It deduction has in like manner been represented which propos possible favorable circumstances of usin aloe vera gel as a piece of cancer ,[42]

4. Moisturizing and anti aging :

Aloe is rich in mucopolysaccharide which help in binding moisture to skin . Aloe stimulates fibroblasts to produce collagen and elastin fibers thereby making the skin more elastic and less wrinkled. It also has cohesive effects on the superficial flaking epidermal cells by sticking them together, which softens the skin . The amino acids present in Aloe gel which also soften hardened skin cells . Zinc present in the gel improves the skin integrity , decreased appearance of fine wrinkles and erythema in the treatment of dry skin associated with occupational exposure indicating its moisturizing effects [43].

5. Aloevera fights stress :

In the modern scenario many people suffer from stress . Today's fast stressful life causes some biochemical and physiological changes in the body , making us susceptible to diseases and dysfunction of organ systems . Aloe juice is helpful in smooth functioning of the body machine [44] . Oxidative stress refers to chemical reactions in which compounds have their oxidative state changed . In the simplest case , oxidation describes the loss of electrons by a molecule , which then becomes what are termed as free radicals. This results in a pro oxidative shift in cellular balance which has been implicated in cause of many serious diseases, including cancers , cardiovascular diseases such as hypertension and atherosclerosis , neurodegenerative diseases such as Parkinson's disease Alzheimer's dementias , diabetes , ischemia injuries , rheumatoid arthritis , and even the process of aging . However , nature has evolved elegant regulatory mechanisms for countering this free radical damage . These primarily involve antioxidant reducing agents that can slow or stop oxidation reaction . Some 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 [45], [46],[47],[48].

6. Aloe vera in heart disease :

Aloe vera juice taken by angina pectoris patients results in marked reduction of serum cholesterol and triglycerides levels and increases HDL levels. Researchers have found that Aloe vera easily stimulates the fibroblasts for making new tissues . When fibroblasts are stimulated , proteoglycans , collagen are formed and thus risk of cardiovascular 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 , seems to accelerate the accumulation of fatty material in large and medium size arteries , including the coronary arteries of the heart [49].

7. Anti-cancer properties:

The Aloe vera produced an important role in cancer causing nature has not been assessed well. The constant misuse of anthranoid tumor , be that as it may , no causal social between anthranoid diuretic misuse and colorectal malignancy has been exhibited and have aloe vera juice enables the body to recover itself from moreover the mischief brought on by radio and chemotherapy that obliterate strong sound safe invulnerable cells basic for the advancement of undermining or repress and suppressed the development of threatening growth bringing about cells making it to have hostile to anti-neoplastic properties .[50]

8. Antiviral activity:

In this study we attempted the antiviral activity of an unpleasant hot glycerine concentrate of Aloe vera gel which has produced in Bushehr (Southwest of Iran) against HSV-2 replication in Vero cell line . The concentrate exhibited antiviral development against HSV-2 not simply before association and area of disease to the Vero cells also on post association periods of contamination replication . Thus , blends of aloe vera from Bushehr could be a tolerable confident as a source trademark .[51]

9. Chronotropic activity:

Trough chronotropic (Heart Rate) impacts , the heart rate is moderated so the diastolic period (the time between real solid compressions [the systolic period] is longer. It is amid the diastolic period that the heart chambers are loaded with blood , prepared for the following beat. Be that as it may, generally as essential , this is the time when the heart unwind and gets its own sustenance. In the event that the heart rate is too quick, the diastolic cardiovascular support time frame is too short. This makes the heart less proficient in pumping and coursing blood.[52]

10. Healing properties:

Topical and oral Aloe vera administration stimulates the activity and proliferation of fibroblast which in turn significantly increases collagen synthesis. This action is due to the presence of Glucomannan, a mannose-rich polysaccharide, and gibberellin, a growth hormone that interacts with growth factor receptors on the fibroblast thereby stimulating its activity and proliferation.[53]

11. Aloe vera and AIDS:

Acemannan present in Aloe vera juice is having anti-viral and immune-modulating properties. A daily dose of minimum 1200mg 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 glucomannan, 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. The medicinal uses of Aloe vera extend to protection against radiation burns.[54]

12. Anti-Diabetic:

The five Phytosterols of Aloe vera, lophenol, 24-methyl-lophenol, 24-ethyl-lophenol, cyloartanol and 24-methylenecycloartanol demonstrated hostile to diabetic impacts in sort 2 diabetic mice. Aloe vera contain polysaccharides which expand the insulin level and show hypoglycaemia properties.[55] Traditional anti-diabetic plants might provide new oral anti-diabet compounds, which can counter the high cost and poor availability of the current medicines for many rural populations in developing countries[56].

13. Cosmetic and Skin Protection Application:

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. The Aloe sugars are also used in moisturizing preparations[57]. Currently, the plant is widely used in skin care, cosmetics and as nutraceuticals[58]. Aloe vera gel has been reported to have a protective effect against radiation damage to the skin[59,60]. Exact role is not known, but following the administration of Aloe vera gel, an antioxidant protein, metallothionein, is generated in the skin, which scavenges hydroxyl radicals and prevents suppression of superoxide dismutase and glutathione derived immunosuppressive cytokines such as interleukin-10(IL-10) and hence prevents UV-induced suppression of delayed type hypersensitive[61].

14. Stress:

Aloe juice is helpful in smooth functioning of the body machinery[62]. It reduces cell-damaging process during stress condition and minimizes biochemical and physiological changes in the body[63]. 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 from oxidative stress[64].

15. Laxative Effects:

Anthraquinones present in latex are a potent laxative ;its stimulating mucus secretion , increase intestinal water content and intestinal

peristalsis .The aloe are due primarily to the 1,8- dihydroxyanthracene glycosides , aloin A and B (formerly designated barbaloin) [65]. After oral administration aloin A and B, which are not absorbed in the upper intestine , are hydrolysed in the colon by intestinal bacteria and then reduced to the active metabolites (the main active metabolite aloe-emodin9-anthrone) [66], which like senna acts as a stimulant and irritant to the gastrointestinal tract [67]. Aloe latex is known for its laxative properties . The laxative effect of Aloe is not generally observed before 6 hours after oral administration , and sometimes not until 24 or more hours after.

Side effect:

Oral aloe can cause cramping and diarrhea , which can lead to electrolyte imbalances and dehydration if used for an extended period time . Long haul utilization of aloe may expand the danger of colorectal tumor . Some patients experienced burning after topical application , [68] contact dermatitis, [69] and mild itching . [70],[71],All adverse effects were reversible and aloe vera was generally very well tolerated . Abdominal spasms and pain , as well as the formation of thin , watery stools. Chronic abuse of anthraquinone stimulant laxative can lead to hepatitis [72] and electrolyte disturbances (hypokalaemia , hypocalcaemia) metabolic acidosis , malabsorption , weight loss, albuminuria , and haematuria [73,74]. Weakness and orthostatic hypotension may be exacerbated in elderly patient when stimulant laxatives are repeatedly used [75]. Secondary aldosteronism may occur owing to renal tubular damage after aggravated use . Steatorrhoea and protein-losing gastroenteropathy with hypoalbuminaemia have also been observed , as have excessive excretion of calcium in the stools and osteomalacia of the vertebral column [76].



Conclusion:

Hence there is no wonder in considering Aloe vera as the 'Wonder plant', Its 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 . various researches have been conducted to prove the efficacy of aloe vera in various health problems . The active ingredient hidden in its succulent leaves have the power to soothe human life and health in a myriad ways . The plant is in need to a greater research emphasis for better utilization of this plant for humankind . Aloe vera

is undoubtedly, the nature's gift to humanity for cosmetic, burn and medicinal application and it remains for us to introduce it to ourselves and thank the nature for its never ending gift.

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