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ALOE VERA : A REVIEW OF ITS MEDICINAL USES AND PHARMACOLOGICAL ACTIONS

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Abstract : Aloe vera, a succulent plant, has been widely recognized for its medicinal and pharmacological properties. Historically used in traditional medicine, Aloe vera's therapeutic applications span dermatology, gastroenterology, and wound care. The plant's gel contains bioactive compounds such as polysaccharides, vitamins, enzymes, and amino acids, contributing to its anti-inflammatory, antimicrobial, antioxidant, and immune modulatory effects. Clinically, Aloe vera has demonstrated efficacy in wound healing, soothing burns, managing skin disorders, and alleviating symptoms of gastrointestinal conditions. Moreover, its pharmacological potential includes anti-diabetic, anti-cancer, and cardio protective activities, supported by both in vitro and in vivo studies. Despite these benefits, concerns about safety, dosage standardization, and potential toxicity, particularly with prolonged use of aloe latex, require further investigation. This review consolidates current knowledge on Aloe vera's medicinal uses and pharmacological actions, highlighting its potential while emphasizing the need for rigorous clinical trials to validate its therapeutic claims.

IndexTerms **- Aloe vera , medicinal use , pharmacological action**

INTRODUCTION

Aloe vera is indeed a fascinating plant with a rich history and numerous benefits. Its name comes from the Arabic word "Alloeh," meaning "shining bitter substance," due to the bitter liquid found in its leaves, and "Vera," which means "true" in Latin.[1,2]. Aloe plants are generally not toxic, but a few can be extremely poisonous. Out of approximately 420 species, only about four have notable medicinal properties. Among them, Aloe vera is considered the most potent and popular. It's also widely grown as an ornamental plant[3,4]. Natural products indeed play a crucial role in pharmaceutical biology. Plants have been a vital source of medicine for thousands of years. Even today, the World Health Organization estimates that up to 80 percent of people still rely mainly on traditional medicines. Many current drugs either mimic naturally occurring molecules or have structures that are fully or partially derived from natural motifs[5]. Natural antimicrobials can indeed be derived from various sources, including barks, stems, leaves, flowers, and fruits of plants, as well as from animal tissues and microorganisms. These natural substances have been used for centuries to combat infections and promote health[6]. The genus Aloe is a perennial succulent herb that thrives in temperate and subtropical regions around the world. Originating in Africa, this genus includes over 200 species. The "juice" from Aloe plants has traditionally been used for laxative purposes and in dried form. Its bitterness is attributed to the presence of aloin, aloe-emodin, and related compounds. The mucilage from Aloe was historically applied to inflamed skin and, during the 20th century, it was used on radiation burns. The bioactive compounds in Aloe are utilized for their astringent, haemostatic, and antidiabetic[7,8], antiulcer, antiseptic[9], antibacterial[10]. Aloe vera is also known for its anti-inflammatory, antioxidant, and anticancer properties. It is effective in treating stomach ailments, gastrointestinal problems, skin diseases, constipation, radiation injury, wound healing, burns, dysentery, and diarrhea. Additionally, it is widely used in skin care, cosmetics, and as a nutraceutical[11]. In the present study, we focus on some of the phytochemical, pharmacological, and traditional properties of Aloe vera. Aloe vera is a stemless or very short-stemmed plant that grows to a height of 60–100 centimeters (24–39 inches) and spreads by offsets[12]. The leaves of Aloe vera are thick and fleshy, ranging in color from green to grey-green. Some varieties even display white flecks on their upper and lower stem surfaces, adding to their unique appearance[13].

Aloe vera is indeed excellent at maintaining moisture, tightening, and smoothing the skin. Its hydrating properties make it a popular ingredient in many skincare products[14]. Aloe vera gel is indeed a popular active ingredient in hundreds of skin lotions, sunblocks, and cosmetics. Its soothing and hydrating properties make it a favorite choice for many skincare products[15]. Aloe vera gel is indeed packed with nutrients. It contains various vitamins such as vitamin B12, vitamin A, other B-group

vitamins, vitamin C, vitamin E, folic acid, and 19 of the 20 amino acids needed by the human body. This makes it a highly beneficial ingredient for both health and skincare products[16].

Aloe vera gel can also be used as a hair styling gel, working especially well for curly or fuzzy hair. It's a versatile ingredient found in makeup, moisturizers, soaps, sunscreens, shampoos, and lotions. Additionally, Aloe vera gel is beneficial for dry skin conditions, particularly eczema around the eyes and sensitive facial skin.

Aloe vera has indeed been used for medicinal purposes in several countries for millennia, including Greece, Egypt, India, Mexico, Japan, and China. Its long history of use across different cultures highlights its versatility and effectiveness in various traditional medicine practices[17].

Synonyms of Aloe vera

The common vernacular names of Aloe vera in India; Sanskrit (Kumarirasasambhava, Sahasara), Assamese (Musabhar, Machambar), Bengali (Ghritakalmi), English (Indian Aloe), Nepali (Gheeukumari), Gujrati (Eliyo, Eariyo), Hindi (Musabhar, Elva), Kannada (Karibola, Lolesara satva, Lovalsara, Lolesara), Kashmiri (Musabbar, Siber), Malayalam (Chenninayakam), Marathi (Korphad), Oriya (Musabara), Punjabi (Kalasohaga, Mussabar, Alua), Tamil (Kattazhi, Satthukkathazhai), Telugu (Musambaram), Urdu (Musabbar, Ailiva, Siber)[18].

Taxonomical classification of Aloe vera

Kingdom	Plante – plants
Sub-kingdom	Tracheobionta – Vascular plants
Super-division	Spermatophyta –Seed plants
Division	Magnoliophyta –Flowering plant
Class	Liliopsida –Monocotyledons
Subclass	Liliidae
Order	Liliales
Family	Aloaceae/ Liliaceae –Aloe family
Genus	Aloe Linn.

Medicinal species[19]

There are indeed over 300 species of Aloe, with most of them being native to South Africa, Madagascar, and Arabia. Each species has somewhat different concentrations of active ingredients, which can affect their medicinal properties and uses. Examples of different Aloe species include Aloe vera, A. vulgaris, A. arborescens, A. ferox (Cape aloe), and A. perryi (Socotrine or Zanzibar aloe). Aloe vera, scientifically known as Aloe barbadensis Miller, belongs to the Asphodelaceae (Liliaceae) family. It is a shrubby or arborescent, perennial, xerophytic, succulent plant with a distinctive pea-green color.

FEROX (CAPE ALOE)

PERRYI (SOCOTRINE OR ZANZIBAR ALOE)

Habitat

Aloe vera primarily thrives in the dry regions of Africa, Asia, Europe, and America. In India, it can be found in Rajasthan, Andhra Pradesh, Gujarat, Maharashtra, and Tamil Nadu[19].

Plant description

The Aloe vera plant is characterized by its triangular, fleshy leaves with serrated edges, yellow tubular flowers, and fruits that contain numerous seeds. Each leaf is composed of three layers: the inner gel, the middle latex layer, and the outer thick rind[20].

[1] The inner clear gel of Aloe vera contains 99% water, with the remaining 1% composed of glucomannans, amino acids, lipids, sterols, and vitamins.

[2] The middle layer of Aloe vera leaves contains latex, which is a bitter yellow sap. This layer contains anthraquinones and glycosides.

[3] The outer thick layer of Aloe vera leaves, known as the rind, consists of 1520 cells and serves a protective function. It synthesizes carbohydrates and proteins. Inside the rind are vascular bundles responsible for transporting substances such as water (xylem) and starch (phloem)[21].

CONTSTITUTION OF ALOVERS[22]

ANTRAQUINONES	SACCHARIDES	INORGANIC COMPOUND	VITAMINS
Alotin / baraloin	Cellulose	Calcium	B1
Isobarbaloin	Mannose	Sodium	B2
Aloe-emodin	L - rhamnose	Chlorium	B6
Exter of cinnamic acid	Aldopentose	Manganeses	Choline
Antranol		Zinc	Folic acid
Chysophamic acid		Chromium	Ascotbic acid
Resitamol antracene		Copper	Alpha - toeopherol
Etereal oil		Magnesium	Beta - carotene
		Iron	

ENZYMES	NONESSENTIAL AMINO ACIDS	ESSENTIAL AMINO	MISCELLANEOUS
Cyclooxygenase	Histidine	Lysine	Cholesterol
Oxidase	Arginine	Threonine	Triglycerides
Amylase	Hydroxyproline	Valine	Steroids
Catalase	Asparitc acid	Leucine	Beta - sitosterol
Lapase	Glutamic acid	Isoleucine	Lignins
Alkaline phospahatase	Proline	Phenylalanine	Uric acid
Cardoxypetidase	Glycine	Methionine	Gibberelline
	Alanine		Lectin like substance
			Salicylic acid
			Arachidonic acid

Active components with its properties[20]

Aloe vera contains 75 potentially active constituents, including vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids. This diverse range of compounds contributes to its numerous health benefits and widespread use in various medicinal and cosmetic applications.

A. **Vitamins:** Aloe vera is packed with vitamins A (beta-carotene), C, and E, which are powerful antioxidants. It also contains vitamin B12, folic acid, and choline, making it a nutrient-rich plant with numerous health benefits. Antioxidants help neutralize free radicals, which can cause damage to cells and contribute to aging and diseases.

B. **Enzymes:** Aloe vera contains eight enzymes: aliiase, alkaline phosphatase, amylase, bradykinase, carboxypeptidase, catalase, cellulase, lipase, and peroxidase. Bradykinase helps reduce excessive inflammation when applied topically to the skin, while the other enzymes assist in the breakdown of sugars and fats.

C. **Minerals:** Aloe vera is a rich source of essential minerals, including calcium, chromium, copper, selenium, magnesium, manganese, potassium, sodium, and zinc. These minerals contribute to its numerous health benefits and make it a valuable addition to various health and skincare products.These minerals are crucial for the proper functioning of various enzyme systems in different metabolic pathways, and some of them also act as antioxidants.

D. **Sugars:** Aloe vera provides monosaccharides (glucose and fructose) and polysaccharides (glucomannans/polymannose). These compounds, derived from the mucilage layer of the Aloe vera plant, are known as mucopolysaccharides. The most prominent monosaccharide is mannose-6-phosphate, and the most common polysaccharides are glucomannans [beta-(1,4)-

acetylated mannan]. These components contribute to the plant's various health benefits and therapeutic properties. Recently, a glycoprotein with antiallergic properties called alprogen and a novel anti-inflammatory compound, C-glucosyl chromone, have been identified in Aloe vera.

E. **Anthraquinones:** Aloe vera provides 12 anthraquinones, which are phenolic compounds traditionally known as laxatives. Among these, aloin and emodin are notable for their analgesic, antibacterial, and antiviral properties.
F. **Fatty acids:** Aloe vera provides four plant steroids: cholesterol, campesterol, βsitosterol, and lupeol. The steroids found in Aloe vera, including lupeol, have antiinflammatory properties. Additionally, lupeol possesses antiseptic and analgesic properties, making Aloe vera a versatile and valuable plant for various therapeutic applications.
G. **Hormones:** Aloe vera contains auxins and gibberellins, which help in wound healing and have anti-inflammatory properties.
H. **Others:** Aloe vera provides 20 of the 22 amino acids required by humans and 7 of the 8 essential amino acids. It also contains salicylic acid, which has antiinflammatory and antibacterial properties. Lignin, an inert substance, enhances the penetrative effect of other ingredients into the skin when included in topical preparations. Saponins, which are soapy substances, make up about 3% of Aloe vera gel. They possess cleansing and antiseptic properties, contributing to the plant's overall therapeutic benefits.

Medicinal uses

Aloe vera is indeed a highly effective natural plant, used both externally and internally, with numerous health benefits. Its versatility and wide range of active constituents make it a valuable addition to various medicinal and cosmetic applications

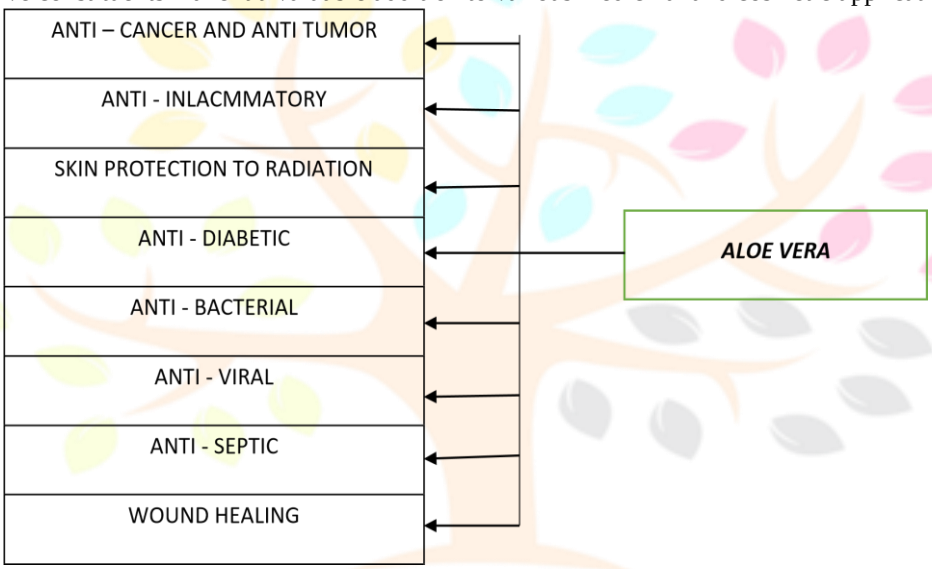


Figure 1: Representing the medicinal utilities of Aloe vera

External Uses of Aloe vera

Aloe vera gel indeed contains a majority of the amino acids and vitamins that are beneficial for our skin. When applied, the gel forms a glue-like substance that acts as a natural "band-aid," sealing in the nutrients and allowing them to start working immediately. This protective layer helps keep out bacteria and other agents that could slow or halt the healing process. Aloe vera gel is indeed high in water content, which is essential for the body to heal. Its hydrating properties make it an excellent choice for soothing and moisturizing the skin, promoting wound healing, and maintaining overall skin health. While Aloe vera is effective when taken orally, it is also beneficial when included in topical formulations like ointments, creams, or lotions. Its moisturizing properties help protect wounds and promote healing[23].

a) **Skin care**
Aloe vera is indeed a versatile ingredient in skincare products, acting as an astringent, moisturizer, humidifier, and cleanser. It offers numerous benefits for the skin, including softening, diminishing wrinkles, and treating conditions like acne, herpes, red spots, psoriasis, eczema, mycosis, fever blisters, and skin irritation. Additionally, Aloe vera provides protection against pollution, making it ideal for sunburns, fragile skin, and the removal and repair of dead skin cells.

b) **Aloe vera cures gum disease**
Aloe vera is indeed beneficial for oral health. Its healing properties make it widely used in periodontal formulations to help eliminate gum disease, mucositis, lip fissures, and mouth herpes lesions. The gel's soothing and anti-inflammatory effects contribute to its effectiveness in treating these conditions.

c) **Relieves itching aids healing**

Aloe vera juice is indeed effective in relieving itching caused by allergies and insect bites. Its soothing properties help reduce irritation and promote healing.

d) **Aloe Vera relieves joint and muscle pain**
Aloe vera sprays or gels can indeed help reduce joint and muscle pain caused by arthritis. The anti-inflammatory properties of Aloe vera, along with its soothing effects, make it a popular natural remedy for alleviating such discomfort.

Internal Uses of Aloe vera

Indeed, numerous scientific studies have demonstrated the impressive range of Aloe vera's medicinal properties. These include its analgesic, anti-inflammatory, wound healing, immune-modulating, and anti-tumor activities, as well as its antiviral, antibacterial, and antifungal properties. Aloe vera's versatility and effectiveness make it a valuable natural remedy for various health conditions. Aloe vera's medicinal properties can indeed be attributed to the synergistic effect of its combined nutritional elements, which produce a more powerful effect than the individual components alone. This powerful combination of nutrients makes Aloe vera a versatile and effective natural remedy for various therapies, aiding in the treatment of different ailments[23].

a) Provides relief in liver infections
Aloe vera juice is known to improve liver function and can act as an excellent antidote in cases of excessive alcohol ingestion. Additionally, it helps prevent scarring of the liver, making it a valuable natural remedy for maintaining liver health.

b) Acts as an anti-inflammatory agent
Aloe vera juice acts as an anti-inflammatory agent, containing 12 essential nutrients that exhibit anti-inflammatory properties. It also has a rare incidence of side effects, making it a safe and effective natural remedy for inflammation. Additionally, Aloe vera juice improves joint and muscle mobility, making it a valuable natural remedy for those experiencing discomfort in these areas.

c) Cures stomach and intestinal problems
Absolutely! Aloe vera juice is known for its ability to help prevent stomach ulcers and facilitate digestion and intestinal transit. Its soothing properties can aid in maintaining a healthy digestive system. Its soothing properties make it a valuable natural remedy for maintaining a healthy digestive system.

d) Aloe vera stabilizes blood sugar and reduces cholesterol in diabetics
Laboratory studies have indeed shown that Aloe vera can stimulate insulin release from the pancreas and lower blood glucose levels in mice. This suggests potential benefits for managing blood sugar levels and diabetes. This suggests potential benefits for managing blood sugar levels.

e) Cholesterol and triglyceride levels can be lowered naturally with Aloe vera
High cholesterol is a significant risk factor for heart disease and strokes. Managing cholesterol levels through a healthy diet, regular exercise, and, if necessary, medication can help reduce the risk of these serious health conditions. Medical studies have shown that Aloe vera gel, when taken internally, can help lower cholesterol levels. This makes Aloe vera a valuable natural remedy for maintaining heart health and reducing the risk of cardiovascular diseases. That's fascinating! The studies indeed confirmed that administering Aloe vera gel to patients with heart disease and high cholesterol helped reduce these conditions to a lower risk. This highlights the potential of Aloe vera as a natural remedy for improving cardiovascular health.

f) Antiviral and anti-tumor activity
Aloe vera indeed stimulates the immune system, which helps protect the body against viral and tumor-related disorders. Its immune-modulating properties make it a valuable natural remedy for enhancing overall health and resilience.

Side Effects of Aloe vera

[1] Topical
While Aloe vera offers numerous benefits, it can cause redness, burning, stinging sensations, and, in rare cases, generalized dermatitis in individuals who are sensitive to it. It's always important to do a patch test before using Aloe vera products extensively to ensure there are no adverse reactions. It's always a good idea to do a patch test before using Aloe vera products extensively. Allergic reactions to Aloe vera are mostly due to the presence of anthraquinones, such as aloin and barbaloin. It's always best to apply it to a small area first to test for any possible allergic reactions[23].

[2] Oral
Indeed, while Aloe vera offers numerous benefits, it can also have side effects. Aloe vera offers numerous benefits, some individuals have reported experiencing side effects such as abdominal cramps, diarrhea, red urine, dependency or worsening of constipation, and hepatitis2. It's important to use Aloe vera products with

caution and consult a healthcare professional if you experience any adverse reactions. Prolonged use of Aloe vera has also been associated with an increased risk of colorectal cancer. That's correct. The laxative effect of Aloe vera can cause electrolyte imbalances, such as low potassium levels, in individuals. It's important to use Aloe vera products responsibly and be aware of potential side effects[23].

Contraindication of Aloe vera

Aloe vera is contraindicated for individuals with known allergies to plants in the Liliaceae family. It's always important to be aware of potential allergies and consult with a healthcare professional before using Aloe vera products[23].

Pregnancy and breastfeeding

Oral Aloe vera is not recommended during pregnancy due to the theoretical risk of stimulating uterine contractions. Additionally, it is also advised to avoid Aloe vera during breastfeeding, as it may sometimes cause gastrointestinal distress in the nursing infant[23].

Interactions

Applying Aloe vera to the skin can increase the absorption of steroid creams like hydrocortisone. This can reduce the effectiveness and increase the adverse effects of medications like digoxin and digitoxin due to Aloe vera's potassium-lowering effect. The combined use of Aloe vera and furosemide can increase the risk of potassium depletion. Additionally, Aloe vera's ability to lower blood sugar levels means it may interact with oral hypoglycemic drugs and insulin, potentially affecting their efficacy. Aloe vera has a wide spectrum of properties and uses, distinguishing between myths and real benefits is crucial. Future controlled studies will be essential to prove its effectiveness under various conditions and provide a clearer understanding of its potential.

Pharmacological Activities

Anti-ulcer activity :
This study was performed to determine the effects of Aloe vera on indomethacin induced ulcers in albino rats. Aloe vera extract showed statistically significant anti-ulcer activity comparable to standard drug Omeprazole. The mean ulcer indexes of two drugs are formed to be statistically significant. Therefore, the results were suggestive of anti-ulcerogenic activity of Aloe vera. However, the cellular mechanisms for anti-ulcerogenic actions remain to be established[24].

Antitumor activity :
Antitumor property of 50% ethanol extract (100 mg/kg) of Aloe vera was evaluated against Ehrlich ascites carcinoma (EAC) tumor in mice. The effect of Aloe vera on the growth of transplantable ascites tumor, body weight of EAC bearing hosts and simultaneous alterations in the hematological profile, serum proteins (ALT, AST, LDH, ALP and glucose) and liver biochemical parameters (lipid per oxidation, GSH and antioxidant enzymes) were estimated. The 50% ethanol extract of Aloe vera exhibited antitumor effect by modulating lipid per oxidation and augmenting antioxidant defense system in EAC bearing mice[25].

Antiviral activity :
Antiviral activities of the crude hot glycerine extract of Aloe vera gel which was grown in Bushehr (Southwest of Iran) against HSV-2 replication in Vero cell line has been studies. The extract showed antiviral activity against HSV-2 not only before attachment and entry of virus to the Vero cells but also on post attachment stages of virus replication. Therefore, compounds of Aloe vera from Bushehr could be a good candidate for antiviral activity[26].

Anxiolytic activity :
Aloe vera was evaluated for its CNS activities in mice and different behavioral activities for anxiety and depression were tested on exploratory activity, open field test, Swimminginduced depression test, stationary rod test, cage crossing and inclined plane test. Aloe vera was administered orally in both sexes of mice (male and female) and was found to cause significant depression in general as well as exploratory behavioral profiles. The results showed that Aloe vera extract caused reduction of exploratory and loco-motor activities along with the significant decrease in traction in an inclined plane test. The results suggest that Aloe vera may have anxiolytic potential with sedative action[27]. Aloe vera was also evaluated for CNS activities in mice and different behavioral activities for anxiety and depression. Aloe vera administered orally was found to cause significant depression in general as well as exploratory behavioral profiles. The results suggest that Aloe vera may have anxiolytic potential with sedative action[28].

Antidepressant activity :
The antidepressant effects of Aloe vera hydro-alcoholic extract at different concentrations were compared with the fluoxetine-treated and the control groups of mice using forcedswimming, FST and open box, OFT tests. Based on the results of the OFT and FST tests, Aloe vera extract at different doses, has favorable antidepressant effects on mice as compared to the fluoxetine treated and the control groups and the better effects were seen by increasing the dose and duration of drug use[29].

Hypoglycaemic effect :

The study aimed to evaluate the antidiabetic activity of Aloe vera ethanolic extract in induced hyperglycemic and normal rats. The results in the hyperglycemic experiment showed highly significant decrease ($P< 0.01$) in plasma glucose level in the group received 500 mg/kg body weight of Aloe vera ethanolic extract. However, the reduction in plasma glucose level at a dose of 100 mg/kg body weight Aloe vera extract and glibenclamide was found to be similar[30].

Antifungal activity :

The antifungal activity was determined by the agar-well diffusion method against plant and human fungal pathogens. The methanol and ethanol portions of the extracts studied were more bioactive than ethyl acetate portion. It was also observed that the activity was more pronounced on plant pathogen than human pathogen except Candida albicans. This is an indication that the extract has the potential to treat plant fungal infections. The Aloe extract showed the significant antioxidant activity by the DPPH radical scavenging method. Therefore, the Aloe extract provided as natural antioxidant has been used in health foods for medical and preservative purposes[31]. Aloe vera gel extracted from the Aloe vera leaves was evaluated for their antifungal activity at 0.15%, 0.25% and 0.35% concentration against five plants pathogenic fungi viz., Aspergillus niger, Aspergillus flavus, Alternaria alternata, Drechslera hawaiensis and Penicillum digitatum 0.35% concentration Aloe vera gel completely inhibited the growth of Drechslera hawaiensis and Alternaria alternate[32].

Wound healing :

The study was undertaken on experimental evaluation of Aloe vera leaves pulp on wound healing activity through topical route on excision wound model. The activity was compared with standard drug Povidone-Iodine ointment (5% w/w). Aloe vera leaves pulp was found to have better and faster wound healing effect than standard drug Povidone Iodine ointment on excision wound model[33].

Immunostimulant activity :

Oral administration of saline extracts of leaves of Aloe vera on the albino mice had been shown immunostimulant effect which could be attributed to the alkaloids content[34].

Antibacterial activity :

This study was to evaluate the antibacterial activity of Aloe barbadensis Miller (Aloe Vera) by using agar diffusion assay and gel filtration chromatography. The bacterial strains used in this research work were Escherichia coli, Bacillus subtilius, Salmonella typhi, Pseudomonas, Klebsiella pneumoniae, Staphylococcus epidermidis. Aloe vera plant leaves and gel were macerated in different organic solvents including ethanol, methanol and distilled water. Then, by using agar diffusion assay antibacterial activity was estimated. The Aloe Vera extract of Methanol showed the maximum antibacterial activity as compared to other solvent extracts. The in-vitro studies of aqueous and methanolic extracts of the roots of Aloe vera shows antimicrobial activity against Bacillus cereus, Escherichia coli, Pseudomonas aerugenosa and Enterobacter aerogens using the agar diffusion method. Preliminary phytochemical analyses showed that the extracts contain flavonoids, terpenoids, tannins, saponins, reducing sugars and anthraquinones[35]. Aloe Vera plant leaves and gel were macerated in different organic solvents including ethanol, methanol and distilled water. Then, by using agar diffusion assay antibacterial activity was estimated. The zones of inhibition were measured by scaling and represented by tables and graphs. The Aloe Vera extract of methanol showed the maximum antibacterial activity as compared to other solvent extracts[36].

Antioxidant Property :

The purpose of this study was to evaluate the ability of aqueous extract of Aloe vera on oxidative damage and Anion Exchanger 1 (AE1, also known as Band 3) expression in human erythrocytes exposed to the water soluble free radical initiator 2.2‟-azobis-2-amidinopropano dihydrochloride (AAPH). In addition, total phenolic compounds in the extracts were determined as catechin equivalent and the various antioxidant activities were compared to natural and synthetic standard antioxidants such as BHA and ascorbic acid. Since Aloe vera extract did not cause a consumption of the cytosolic antioxidant, glutathione (GSH) when it was direct incubated with GSH in basic aerated aqueous solution, this indicates that Aloe vera extract does not proceed auto oxidation at this experimental condition[37]. In-vivo Aloe vera leaf gel shown significant antioxidant capacity due to the presence of the antioxidant polyphenols, indoles, and alkaloids which is confirmed by ORAC and FRAP analyses[38].

Anti-inflammatory Activity :

Studies on aqueous extract of whole leaf of Aloe vera at various concentrations had shown significant anti-inflammatory and analgesic activities in albino wistar rats model[39].

Mutagenic and Anti-mutagenic Activity :

Mutagenic and anti-mutagenic activity of Aloe vera in Allium cepa test and micronucleus test in human bi-nucleated lymphocytes result was observed that at the usual dose, the solution of Aloe vera was not mutagenic for the plant test system and not for humans. At a dose ten times more concentrated caused a cytotoxic and mutagenic effect in Allium cepa. In plant cells the solution was anti-mutagenic only when placed after paracetamol, while in human cells, this action was manifested when the solution was used at the same time with paracetamol[40].

Nephroprotective Activity :

In the present study, single oral 100–200 mg/kg/day of the leaf aqueous extract of Aloe barbadensis were studied for their protective effects in gentamicin and cisplatin-induced nephrotoxic wistar rats for 7 days and 5days respectively. In the gentamicin nephrotoxic rats, 100–200 mg/kg/day significantly attenuated elevations in the serum creatinine, total protein and blood urea nitrogen levels in

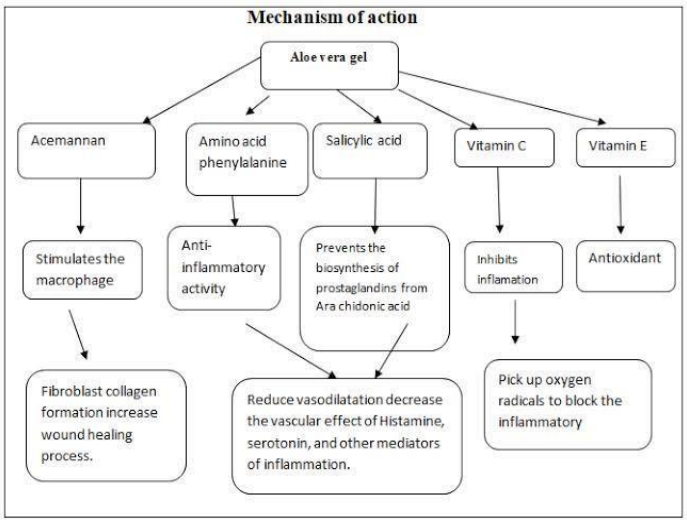
dose related fashion and no treatment related effect on uric acid and ions, as well as, attenuation of gentamicin-induced tubulonephrosis. Similar effects were also recorded in the cisplatin model of acute renal injury. Results suggest that the nephroprotective effect of Aloe barbadensis could be due to the inherent antioxidant and freeradical-scavanging principle(s) contained in the extract[41].

Uses / benefits of Aloe vera gel :

It is used as base material for the production of creams, lotions, soaps, shampoos, facial cleansers and other products. In the pharmaceutical industry, it is used for the manufacturing of topical products such as ointments and gel preparations, as well as in the production of tablets and capsules dried aloe gel has been successfully used to manufacture directly compressible matrix type tablets.

Aloe gel made different cosmetic products [42]

Mechanism action of Aloe vera gel[43]



BENEFITS :

Benefits	References
Aloe vera is considered a natural laxative.	[44]
Aloe vera to keep skin clear and hydrated	[45]
Aloe vera Potential to fight breast cancer	[46]

Aloe vera juice use can cause blood sugar levels is low in diabetic patients.	[47,42]
Aloe Vera gel helps in activating new hair growth as it increases blood circulation to the scalp. It also provides essential minerals and vitamins.	[48]
Aloe Vera helps in healing dry skin, fungal infections and excessively oily skin. The natural ways to get rid of dandruff.	[49]
The nourishing and healing properties of aloe vera work to restore skin to its former suppleness. Beneficial for face and foot skin.	[50,51]
It may improve skin and prevent wrinkles	[52]
It reduces dental plaque	[53]

Conclusion :

Aloe vera has demonstrated a wide range of therapeutic benefits, including anti-ulcer, antimicrobial, anti-inflammatory, analgesic, antioxidant, and potential anxiolytic and antidepressant properties. Studies have shown its effectiveness in various applications, from treating ulcers and fungal infection to protecting against oxidative damage and nephrotoxicity. However, its important to use Aloe vera with caution, as some individuals may experience adverse reactions.

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