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Mini Tiwari

M.Phil. Chemistry, Dr. C.V.
Raman University Kargiroad
Bilaspur, Chhattisgarh, India

Dr. Manish Upadhayay

Principal and HOD in
Department of Chemistry, Dr.
C.V. Raman University,
Kargiroad Bilaspur,
Chhattisgarh, India

The medicinal plant components and applications (*Aloe vera*)

Mini Tiwari and Dr. Manish Upadhayay

Abstract

Aloe vera has marvelous medicinal properties. *Aloe vera* is one of the most powerful and well-known medicinal plants. It has been used for more than 5000 years, and traces of it have been found in numerous civilizations. Today, it has a strong global reputation due to its widespread usage in cosmetics, particularly to treat burns and sunburn, to aid wound healing, and to fight against cell aging. *Aloe vera* plant also used as reinforce the immune system and improve blood circulation. The range of usage of *Aloe vera* is thus very broad even if it has very specific benefits for the skin. The ten main areas of chemical constituents of *Aloe vera* include amino acids, anthraquinones, enzymes, minerals, vitamins, lignin, monosaccharides, polysaccharides, salicylic acid, saponins, and steroids. Many benefits and properties are found in *Aloe vera*, due to present components in it. Now a days, many products in the market are available in the form of *Aloe vera* products such as juice, cream, shampoo, sweets and many other things. Medicated plants have major impact on the day-to-day life. These types of plant are effectively and economically, which are adopted in different field of science and technology. The aim of review is to study the background, characteristic and application of *Aloe vera* plant. The discussion shows that it's physically, biologically and chemically suitable in many applications.

Keywords: Immunostimulant, antileukopenic, andongensis

Introduction

The *Aloe vera* look like a cactus but it isn't. The botanical name of *Aloe vera* is *Aloe Barbadensis* miller. It belongs to Lily family, and is a shrubby or arborescent, perennial, xerophytes, succulent, and pea-green color plant. Inside the leaf is a jelly like substance. The properties of *Aloe vera* were well accepted from China to India. Today, *Aloe vera* is cultivated throughout the world. Terms including, the potted physician and nature's medicine chest, attempted to describe the significant historical uses of *Aloe vera*. There are over 250 species of aloe grown around the world. However, only two species are grown today commercially, with *Aloe Barbadensis* Miller and *Aloe aborescens* being the most popular. The *Aloe* plant is grown in warm tropical areas and cannot survive freezing temperatures. The *Aloe vera* plant has been known and used for centuries for its health, beauty, medicinal and skin care properties. The name *Aloe vera* derives from the Arabic word "Alloeh" meaning "shining bitter substance," while "Vera" in Latin means "true" 2000 years ago, the Greek scientists regarded *Aloe vera* as the universal panacea. The Egyptians called *Aloe* "the plant of immortality." Today, the *Aloe vera* plant has been used for various purposes in dermatology. *Aloe vera* has long been used as a remedy in many cultures. *Aloe* preparation, including products based on both the gel and leaf is used, among other reasons, as laxative, in creams for skin in functional foods, and treatment for a wide range of diseases. Various regional names for *Aloe vera* are Kuwaargandal (Punjabi), Gheekanwaar (Hindi), Ghrita Kumari, Kumaari, Ghrit Kumaarika (Sanskrit), Indian *Aloe* (English), Kumari (Malayalam, Oriya), Katarazhai, Kilimukan, Chirukuttali (Tamil), Lolisara (Kannada), Kumarpattu (Gujrati), Chinna Kalabanda (Telugu), Ghrit Kumaari (Bengali), Korepharh (Marathi). The folk name of this plant is "Kanniedood", which means "can-not die". Most formularies and reference books regard *Aloe barbadensis* Mill. As the correct species name and *Aloe vera* (L.) Burm. f. as a synonym. According to the International Rules of Botanical Nomenclature, *Aloe vera* (L.) Burm. f. is the legitimate name for the species (Newton 1979, Tucker 1989, Bradley 1992) and it belongs to family Liliaceae. The genus *Aloe* has also been placed taxonomically in a family called *Aloaceae*. *Aloaceae* is division/sub-division of family Liliaceae but has limited acceptance.

Correspondence

Dr. Manish Upadhayay
Principal and HOD in
Department of Chemistry, Dr.
C.V. Raman University,
Kargiroad Bilaspur,

Aloe vera is as old as civilization and has been used in almost as many applications as one can imagine. It has a long history dating from Biblical times. *Aloe vera* has a high enzyme content (about 92 enzymes) which makes it rare and valuable resource. *Aloe vera* contains mostly water (90-99.5%). Other potentially active constituents of *Aloe vera* include sugars, lignin, saponins, anthraquinones, salicylic acid and amino acids (Antherton 1998). Reynolds and Dweck (1999) listed 16 different polysaccharides that have been extracted from the *Aloe vera* leaf. A variety of minerals like aluminum, boron, barium, calcium, iron, magnesium, sodium, phosphorus, silicon and strontium has been detected in Aloe gel (Yamaguchi *et al.* 1993). The *Aloe vera* leaf contains over 75 nutrients and 200 active compounds including 20 minerals, 18 amino acids and 12 vitamins (Park and Jo 2006). *Aloe vera* is world's best natural anti-septic, anti-biotic, anti-microbial, anti-viral, anti-toxic, anti-bacterial, antiallergic, anti-inflammatory, anti-ulcer, anti-diabetic, anti-tumor, anti-fungal, immunostimulant and extremely effective intracellular anti-oxidant. This wonderful plant is reported to be used as purgative, analgesic, tonic, pain killer, ant asthmatic, antileukopenic, antipyretic, antihelmintic, decoagulant, demulcent, diuretic, emollient, worms excellent, hair stimulant, hypoglycemic, insecticides, liver stimulant, local anesthetic, rejuvenate, appetite stimulant, stomachache, uterine stimulant, parasite killer (Afzal *et al.* 1991, Kahlon *et al.* 1991, Batram 1995, Kawai *et al.* 1998, Lee *et al.* 2001, Ferro *et al.* 2003, Grover *et al.* 2002, Cock Ian Edwin 2008). *Aloe vera* has been used for centuries for the above discussed properties. We can say that it is a "pharmacy in a pot". Long list of diseases cured by *Aloe vera* includes Allergies, allergies associated with plants or insects, abrasions, acne, anemia, arthritis, treat AIDS, bad breath, burns, boils, bits, blisters, body cleanser, body pain, cataracts, corneal ulcers, cuts, conjunctivitis, coughs, cold, cold sores, constipation, chronic ulcers, dermatitis, dandruff, dry skin, dental sores, diabetes, digestive disorders, dysentery, eczema, edema, eye infection, fever, gingivitis, glaucoma, gastrointestinal ulcers, heat burn, high blood pressure, infected pierced ears, insect stings, joint pain, kidney infections, laxation, lowers blood lipid levels, minor sore throats, migraine headaches, mouth irritations, mouth and gum diseases, muscle cramps, nausea of all kinds, oral disorders, pimples, psoriasis, radiation burns, rashes, ringworm, scars, scalds, sunburns, skin cancers, swelling, tuberculosis, ulcers, vaginitis, venereal sores, wounds of all kinds, warts, x-ray burns, yeast infections and so on (Davis *et al.* 1987, Fulton 1990, Tarro 1993, Chithra *et al.* The Aloe products are widely adopted as main ingredients in cosmetic and hair care products. Large numbers of Aloe containing beauty products, creams, lotions, soaps, shampoos, oils, facial cleaners, moisturizers, etc. are available worldwide. International Aloe Science Council (IASC), a non-profit organization certifies *Aloe vera* products by measuring total solids, calcium, magnesium, malic acid and polysaccharide content. *Aloe vera* gel contains two hormones – Auxin and Gibberellins, which helps healing and anti-inflammatory properties that reduce skin inflammation. Gibberellins in *Aloe vera* acts as a growth hormone encouraging the growth of new cells. It allows the skin to restore quickly and naturally with minimal damaging. Currently, *Aloe vera* gel was widely used species both commercially and for their therapeutic properties. *Aloe vera* products are among the popular ones for these applications today, the *Aloe vera* industry is flourishing and the gel is used

The Aloe Leaf structure made up of four layers

in many products such as fresh gel, juice and other formulations for health, medicinal and cosmetic purposes. Therefore, the clarification of the modes of action of the biochemical components of *Aloe vera* is important in the determination of the most efficient way of using such active species effectively and developing their applications. The review aims to provide a succinct resume of information regarding *Aloe vera* to serve as a reference for further investigations about this potential ingredient to develop an effective method for exploring of *Aloe vera* leaf. Besides, agronomy of *Aloe vera* was described in this paper providing technology information for researchers who concentrate on the accumulation of the active ingredients and agricultural cultivation.

Plant Properties

The botanical name of *Aloe vera* is *Aloe barbadensis* miller. It belongs to Asphodelaceae (Liliaceae) family, and is a shrubby or arborescent, perennial, xerophytes, succulent, pea green color plant. It grows mainly in the dry regions of Africa, Europe, and America. In India, it is found in Rajasthan, Andhra Pradesh, Gujarat, Maharashtra, and Tamilnadu. Aloe's thick, tapered, spiny leaves grow from a short stalk near ground level. It is not a cactus, but a member of the tree lily family, known as *Aloe barbadensis*. Aloe is related to other members of the Lily family such as the onion, garlic and turnip families. Aloe's relationship to the lily family is evident from the tubular yellow flowers produced annually in the spring that resemble those of the Easter lily. The Aloe plant is grown in warm tropical areas and cannot survive freezing temperatures. The leaves of the Aloe plant grow from the base in the rosette pattern. Mature plants can grow as tall as 2 and a half inches to 4 feet with the average being around 28 to 36 inches in length. Each plant usually has 12-16 leaves that, when mature, may weigh up to three pounds. The plants can be harvested every 6 to 8 weeks by removing 3 to 4 leaves per plant. The original commercial use of the Aloe plant was in the production of a latex substance called Aloin, a yellow sap used for many years as a laxative ingredient. This product became synonymous with the name "Aloe" and recorded in the trade, technical and government literature during the early 20th century. This terminology created much confusion later when Aloe's other main ingredient, Aloe Gel, a clear colorless semi-solid gel, was stabilized and marketed. Public interest in Aloe has grown quickly, and now there is a considerable amount of research into the various components of Aloe to find out more about their properties and to characterize these components so that more specific research can provide clues to the "magic" that is attributed to *Aloe vera*.

▪ *Aloe vera* plant anatomy

The plant has triangular, fleshy leaves with serrated edges, yellow tubular flowers and fruits that contain numerous seeds. Each leaf is composed of three layers:

1. An inner clear gel that contains 99% water and rest is made of glucomannans, amino acids, lipids, steroids and vitamins.
2. The middle layer of latex which is the bitter yellow sap and contains anthraquinones and glycosides.
3. The outer thick layer of 15 -20 cells called as rind which has protective function and synthesizes carbohydrates and proteins. Inside the rind are vascular bundles responsible for transportation of substance such as water (xylem) and starch (phloem)

1. **Rind** - the outer protective layer.

2. **Sap** - a layer of bitter fluid which helps protect the plant from animals.
3. **Mucilage Gel** - the inner part of the leaf that is filleted out to make *Aloe vera* Gel.
4. ***Aloe vera* (inner gel)** contains the 8 essential amino acids that the human body needs but cannot manufacture. We believe you will come to realize (as we have) that *Aloe vera* is great for your body-both internally and externally. *Aloe vera* has some fantastic natural healing benefits which is why it has earned the title "miracle plant".

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 to untold numbers of anecdotal reports which represent subjective impressions or appraisals.

- Gastrointestinal Disorder
- Atherosclerosis and Coronary Heart Disease

Compared with the control animals, the group fed the Aloe

Fraction Showed

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

There were some remarkable effects in three important areas

Lipid Metabolism

- a. Decreased total cholesterol.
- b. Decreased triglycerides.
- c. Increased HDL cholesterol.

Carbohydrate Metabolism

Decreased fasting blood sugar levels in diabetic patients.
Decreased post-prandial (after a meal) elevation in blood sugar levels in diabetic Patients.

Angina pectoris (chest pain from insufficient delivery of oxygen to the heart.) Decreased frequency of anginal attacks. These data in the human study suggest that the benefit from the regimen, at least in part attributable to the ingested Aloe beverage, may have salubrious effects on several systems in the body. (Agarwal, 1985)

- Anti-Cancer Actions
- Immune System

Where are the *Aloe vera* Constituents Made?

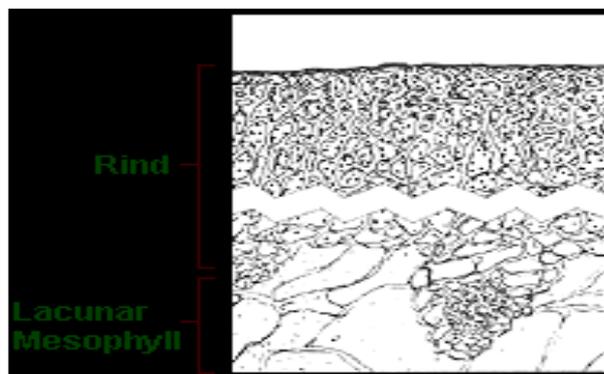


Fig 1: A composite photo micrographic section through the Outer layers of the leaf of *Aloe barbadensis* Miller, Showing the thick green rind and the outer portion of the Lacunar mesophyll.

Just beneath the thick green rind are located the vascular bundles, the outer support of the vascular bundle is provided by the sheath cells. Inside the vascular bundles are three types of tubular structures: the xylem (transports water and minerals from roots to leaf) the phloem (transports starches and other synthesized materials to the roots), and the large pericyclic tubules (containing the yellow latex or sap which is very high in the laxative anthraquinones, especially aloin). The anthraquinones absorb ultra violet rays of the sun and prevent overheating of the central portion of the Aloe leaf, the water storage organ. Note that the pericyclic portion of the vascular bundle is adherent to the rind, while the remainder of the vascular bundle protrudes into the lacunar (large spaces) parenchyma or mesophyll, which is very thick and slimy. This provides a movable layer between the more solid inner gel fillet and the stiff outer rind. This liquid layer is termed the mucilage. The innermost and major portion of the leaf is the spongy parenchyma or mesophyll constituting the gel fillet. This layer has more structural integrity than the slimy mucilage layer.

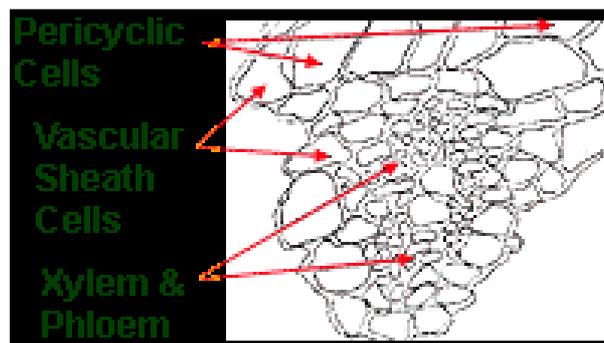


Fig 2: The various portions of the tubules of a vascular bundle are labeled. The pericyclic tubules contain the laxative agents of the yellow sap or latex. Xylem and phloem Vessels serve in water and nutrient transport, Respectively.

All of the carbohydrate (polysaccharides) and glycoprotein (enzymes) constituents of the Aloe leaf are made in the thick green rind. Carbohydrates synthesized in excess of that needed for energy metabolism are transported to the gel fillet for storage of water and minerals and carbohydrates. The carbohydrates are transported by the phloem vessels to small cellulose-containing vessels in the gel fillet, which constitutes most of the pulp of the fillet. Water is then osmotically attracted to the carbohydrates serving as the water storage organ of the plant. The carbohydrates (and small

amounts of lipids or fats) consist of carbon, oxygen and hydrogen. These are derived from carbon dioxide from the air taken into the leaf through the stomata (pores) at night, and water from the ground. There is no sunlight to energize the photosynthesis mechanism to change the CO₂ into carbohydrate. The entrapped CO₂ is stored as malic acid, which gives the internal part of the leaf an acidic pH of about 4.0. When sunlight hits the leaf, some of the malic acid can be changed to the carbohydrate used as fuel by the plant's synthetic machinery. Only a portion of the carbohydrate is used for energy, the remainder being stored in the mucilage and gel fillet.

Chemistry

Definition

Plant material derived from the aloe plant is characterized by its source (e.g., what part of the plant), the species of plant, the physical description of the material, and by the constituents found in the material. The definitions of each ingredient, according to the International Cosmetic Ingredient Dictionary and Handbook (Gottschalk and McEwen 2004), are:

Aloe Andongensis Extract is the extract of the leaves of Aloe' andongensis.

Aloe Andongensis Leaf Juice is the liquid expressed from the leaves of Aloe' andongensis.

Aloe Arborescence Leaf Extract is the extract of the leaves of Aloe arborescence.

Aloe Arborescence Leaf Juice is the juice expressed from the leaves of aloe arborescence

Aloe Arborescence Leaf Protoplasts are the protoplasts obtained from the leaves of Aloe arborescence.

Aloe Barbadosis Flower Extract is the extract of the flowers Of Aloe arborescence

Aloe Barbadosis Leaf is a plant material derived from the leaves of Aloe arborescence.

Aloe Barbadosis Leaf Extract is an extract of the leaves of Aloe arborescence.

Aloe Barbadosis Leaf Juice is the juice expressed from the leaves of Aloe arborescence.

Aloe Barbadosis Leaf Polysaccharides is the polysaccharide fraction isolated from the leaf of Aloe barbadosis.

Aloe Barbadosis Leaf Water is an aqueous solution of the odoriferous principles distilled from the leaves of Aloe

barbadosis.

Aloe Ferox Leaf Extract is an extract of the leaves of Aloe ferox.

Aloe Ferox Leaf Juice is the juice expressed from the leaves of Aloe ferox.

Aloe Ferox Leaf Juice Extract is an extract of the juice of the leaf of Aloe ferox.

Biological activities of *Aloe vera* leaf gel

It has been claimed that the polysaccharides in *Aloe vera* gel have therapeutic properties such as immunostimulation, anti-inflammatory effects, wound healing, promotion of radiation damage repair, anti-bacterial, anti-viral, anti-fungal, anti-diabetic and anti-neoplastic activities, stimulation of hematopoiesis and anti-oxidant effects. On the other hand, there are a number of clinical reports that have found *Aloe vera* gel not effective in terms of the above mentioned therapeutic activities or even to cause undesirable effects such as retardation of wound healing. As mentioned before, these conflicting results could be due to the use of plants from different locations with variations in their chemical composition and also because of different isolation techniques that were used to extract compounds from the aloe leaf pulp. The importance of why the specific compounds that were isolated from a plant and then tested in a particular bioassay should be known can be demonstrated by the potential antagonistic and competitive activities between constituents. When the two maloyl glucans, namely veracylglucan B and C, were each individually evaluated for biological activities it was found that veracylglucan B demonstrated high anti-inflammatory and anti-proliferation effects, while veracylglucan C exhibited significant cell proliferative and anti-inflammatory activities. Therefore, if Some of the biological activities of *Aloe vera* gel will only be briefly described in this review as it has been comprehensively discussed elsewhere.

- Anti -diabetic effect.
- Immunomodulatory effects.
- Anti oxidant effects.
- Anti -cancer effects.
- Wound healing effects.
- Skin hydration effects.
- Antimicrobial activities.

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

Chemical Group	Constituents	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
Enzymes	Anthranol,barbaloin, chrysophanic acid, ethereal oil, ester of cinnamonic acid, isobarbaloin, resistannol	Antifungal & antiviral activity but toxic at high concentrations
Anthraquinones	Provides aloe emodin, aloe tic acid, alovin, Anthracine.	Analgesic, Antibacterial
Steroids	Cholesterol, lupeol, camp sterol, sistosterol	Anti-inflammatory agents, lupeol has anticancer, antiseptic and analgesic Properties.
Hormones	Auxins and gibberellins	Wound healing and anti-inflammatory
Salicylic Acid	Aspirin like compounds	Analgesic
Saponins	Glycosides	Cleansing & antiseptic
Minerals	Calcium,chromium,copper, iron, manganese, potassium, sodium and zinc	Essential for good health
Sugars	Monosaccharide's:Glucose and Fructose Polysaccharides: Glucomannans/polymnose	Sugars Monosaccharide's: Glucose and Fructose Polysaccharides: Glucomannans/polym
Vitamins	A, B, C, E, choline, B12, folic acid	Antioxidant (A,C,E),neutralizes free radicals

▪ **Machanism of action /benefits of *Aloe vera* plant:**

Plant parts uses: both the gel and the latex from the leaves of aloe are used medicinally but for quite different purpose. Whether using raw aloe or purchasing a prepared remedy, one should be careful in distinguishing between the latex and the gel. The gel is the pulpy, transparent content of the split-open leaves and familiar to anyone who has used aloe to treat kitchen burns. The latex is a yellowish sap found closer to the inner skin of the leaves and which drains when the leaves are cut open. The latex is also known as ‘aloe bitters’ and is used to make ‘aloe water’ or dried into a powder .it is highly laxative.

Therapeutic uses and benefits of *Aloe vera*

***Aloe vera* gel:** The gel, more correctly ‘mucilage’ is best known for treating injuries and irritations of the skin, especially minor burns, and cuts. it is a common house plant that is often kept in kitchens as a first aid .a piece of the succulent leaf can be cut off and opened and the gel applied directly to the burn or cut .it should not be used on deep wounds. The ability of the herb to treat burns is very well – established in the practice of medicine and it is often used in the hospital to treat burns from radiation therapy. The anti-inflammatory action of the gel means it can aloe reduce swelling from bruises and sprains .this is a traditional use of the plant in Caribbean he active ingredient is thought to be the enzyme Bradykinase. It can also treat some of the underlying causes of hair loss such as acne, dandruff, and seborrhea. For the same reason. *Aloe vera* gel is as a toothpaste cleanse the mouth and to prevent gum disease. This was recommended back in the middle ages –by the famous nun and scholar Hildegard of Bingen. Controlling blood sugar levels, with the potential of new treatments for diabetes.

***Aloe vera* Latex:** The latex produced by the skin of the leaves, also called aloe juice, aloe water or aloe bitters, is quite different in chemical composition from the gel or pulp. The latex contains powerful anthraquinones including aloins, hydroxyaloin, aloe –emodin and aloe resins.

The primary use of the latex is a laxative. The principle mode of action is through the anthraquinones present in the latex, which stimulate bowel contractions.

In particular, aloe –emodin, found in the latex, is cited as a potential anti-cancer drug in the case of lung cancer, prostate cancer and skin cancer.

***Aloe vera*:** Topical applications of the gel are considered safe in treating skin irritations and minor burns and cuts. it should not be applied to a deep wound, serious burn, or very severe rash without the supervision of medical doctor. Some herbal medicinal sources recommended the ingestion of *Aloe vera*

gel; for example, by putting the gel in a blender and making a smoothie .this is not necessarily a safe practice, especially since the dosage is uncontrolled and too much of the latex may be mixed in with the gel. The results could be quite harmful to the digestive tract and cause other problems .therefore; a gel preparation intended for consumption should be obtained from a reputable herbalist rather than prepared at home.

Aloe latex: There has been much debate regarding the safety of aloe latex .experts in botany and herbalism differ in their opinions on consuming the latex at the very least, one should not attempt to make a home concoction of aloe juice and any commercial aloe juice should be assessed for standardized dosage. People suffering from intestinal or kidney problems should also avoid using the latex. The latex in any form, even from a reputable source, should never be used by children, pregnant or nursing mothers and by women during their menstrual cycle. The ingredients in the latex can also lower potassium level, making it dangerous when used with heart medicine.

3. Methodology

High performance liquid chromatography or high liquid chromatography (HPLC) is a chromatographic method that is used to separate a mixture of compounds’ to identify or purify the individual components of a mixture .it allows you to use a very much smaller particle size for the column packing material which gives a much greater surface area for interaction between the stationary phase and the molecules flowing past it. This allows a much better separation of the components of the mixture. The other major improvement over column chromatography concerns the detection methods which can be used these methods are highly automated and extremely sensitive .low and high pressure liquid chromatography (LPLC and HPLC) based separation techniques are most widely used for fractionation, purification and size determination .Ion exchange chromatography is a separation technique based on the charge of molecules. It is useful for separation of charged molecules from the neutral ones. Gas chromatography (GC) is another widely employed technique. The mobile phase is gas, instead of liquid as in LPLC or HPLC. It is suitable for the analysis of volatile compounds. For example, acetyl or methyl groups on a polysaccharide can be measured by this method following saponification. Other commonly used analytical methods include specific rotation, infra-red (IR) and nuclear magnetic resonance (NMR) spectroscopy. Improved Chromatographic Methods for Determination of Bio active Compounds from *Aloe vera* Leaves.

Table 2: Analysis results for samples at different pH values (initial sample concentration was 28.5 µg·mL⁻¹).

Sample pH	Added (µg·mL ⁻¹)	Determined (µg·mL ⁻¹)	Recovery (%)	RSD (% , n-3)
2.0	0	27.4	99.65	2.4
	10	38.5	100.78	1.6
	50	77.2	99.62	3.5
4.0	0	28.4	100.00	2.3
	10	38.3	98.96	1.6
	50	78.4	100.00	1.2
6.0	0	28.7	100.70	3.7
	10	38.7	100.26	2.4
	50	78.4	99.62	2.4

Wet Classical Method

Analysis of foods is requesting the development of more durable, influential, fragile, and cost-effective analytical methodologies. Also food analysis guarantees the safety, quality, and traceability of foods in coherence with law and consumers' demands. The old methods used at the beginning of the twentieth century called as "wet chemistry" have improved the current powerful instrumental techniques used in food laboratories. In addition to modern analytical instrumentation, wet chemical analyses are offered. Often, modern instrumentation cannot determine results which many specific wet chemical tests provide. Wet chemistry includes basic experimentation techniques such as measuring, mixing, and weighing chemicals, conductivity, density, pH, specific gravity, temperature, viscosity, and other aspects of liquids. Wet chemistry is usually qualitative. Qualitative means to determine the presence of a specific chemical rather than the exact amount. Some quantitative techniques are used in wet chemistry, and they occur as gravimetric (weighing) and volumetric analysis (measuring). Wet chemistry is a form of analytical chemistry that uses classical methods such as observation to analyze materials. It is called wet chemistry since most analyzing is done in the liquid phase. Wet chemistry is also called bench chemistry since many tests are performed at lab benches.

Methods

- 1. Qualitative Methods:** Qualitative methods use changes in information that cannot be quantified to detect a change. This can include a change in color, smell, texture, etc.
 - Chemical Tests: When burned, lead produces a bright white flame. Chemical use reagents to indicate the presence of a specific chemical in an unknown solution. The reagents cause a unique reaction to occur based on the chemical it reacts with, allowing one to know what chemical is in the solution. An example is Heller's test where a test tube containing proteins has strong acids added to it. A cloudy ring forms where the substances meet, indicating the acids are denaturing the proteins. The cloud is a sign that proteins are present in a liquid. The method is used to detect proteins in a person's urine.
 - Flame Test: The flame test is a more well known version of the chemical test. It is only used on metallic ions. The metal powder is burned, causing an emission of colors based on what metal was burned. For example, Calcium (Ca) will burn orange and Copper (Cu) will burn blue. Their color emissions are used to produce bright colors in fireworks.
- 2. Quantitative Methods:** Quantitative methods use information that can be measured and quantified to

indicate a change. This can include changes in volume, concentration, weight, etc. Solids are filtered out of the liquid, which is collected in the beaker.

- 3. Gravimetric Analysis:** -Gravimetric analysis measures the weight or concentration of a solid that has either formed from a precipitate or dissolved in a liquid. The mass of the liquid is recorded before undergoing the reaction. For the precipitate, a reagent is added until the precipitate stops forming. The precipitate is then dried and weighed to determine the chemicals concentration in the liquid. For a dissolved substance, the liquid can be filtered until the solids are removed or boiled until all the liquid evaporates. The solids are left alone until completely dried and then weighed to determine its concentration. Evaporating all the liquid is the more common approach.
- 4. Volumetric Analysis:** -Titration is called volumetric analysis since it relies on volume measurements to determine the quantity of a chemical. A reagent with a known volume and concentration is added to a solution with an unknown substance and concentration. The amount of reagent required for a change to occur is proportional to the amount of the unknown substances. This reveals the amount of the unknown substance present. If no visible change is present, an indicator is added to the solution. The indicator changes color based on the pH of the solution. The exact point where the color change occurs is called the endpoint. Since the color change can occur very suddenly, it is important to be extremely precise with all measurements.
- 5. Colorimetric:** Colorimetry is a unique method since it has both qualitative and quantitative properties. Its qualitative analysis involves recording color changes to indicate a change has occurred. This can be a change in shading of the color or a change into a completely different color. The quantitative aspect involves sensory equipment that can measure the wavelength of colors. Changes in wavelengths can be precisely measured and help indicate changes.

4. Result

Morphological features based upon qualitative as well as quantitative traits for 12 type genotypes of *Aloe vera* collected from three different locations of eight districts of were investigated and the results obtained are presented here as under.

Qualitative Characters

Various leaf morphological characters studied for twelve genotypes of *Aloe vera* from 12 different sites were

Leaf Morphology	Characters
Leaf shape	For all the selected genotypes the shape of the leaves was found to be linear lanceolate. Thus no variation was observed with respect to this morphological descriptor
Leaf margin	Small soft spines of green color were present on both the margins of all the leaves of twelve genotypes as shown in. So no variation was observed with this character
Leaf orientation	The observations were based on the arrangement of the leaves around the stem. All the twelve genotypes were having spiral orientation. Hence this factor also did not give any variation.
Leaf color	The colors of the leaves were observed as pea green and dark green. Majority of the genotypes showed pea green color (12 genotypes).
Leaf shape	For all the selected genotypes the shape of the leaves was found to be linear lanceolate. Thus no variation was observed with respect to this morphological descriptor

Aloe vera study given some questions answer that is

What is Aloe? Aloe is a succulent plant widely used in

alternative medicine. There are at least 420 different plant species of Aloe. *Aloe vera* specifically refers to the Aloe

barbadensis Miller plant, which is the most common form used in Aloe-based products.

How is Aloe used? Traditionally, the clear gel from the Aloe plant is rubbed on the skin as an ointment to treat wounds and burns. The green part of the leaf can be made into a juice or dried and taken orally as a laxative. *Aloe vera* is used in many commercial products in various forms, including drinks, concentrates, capsules, powders, and as a flavoring.

What is the difference between decolorized and non-decolorized Aloe? The difference between decolorized and non-decolorized whole leaf extracts is mostly in how the leaf is processed or filtered. In many cases, manufacturers of oral products containing *Aloe vera* use a charcoal filtration process to decolorize and remove some of the components from the leaf, including anthraquinones, which act like laxatives. Some anthraquinones have previously been shown to be carcinogenic.

5. Conclusions

We have developed an analytical method based on HPLC for validation and determination of Aloins A and B contained in the extract and derived formulations. The proposed method is simple and shows good sensitivity, precision and this method can be extended for the analysis of bioactive compounds present in the commercial formulations to study their adulteration from the product available in the market. In comparison with the previously reported methods, the proposed one had advantages for the scientific validation of aloin content in the commercial products. *Aloe vera* bulk as well as extracts are widely used in food, cosmetic, healthcare, skincare and medical industry as active ingredients for extra therapeutic, hygienically, rejuvenating, Health enhance effectives. Although, *Aloe vera* has wide spectrum of the properties and uses. Food and Drug Administration of USA has already approved the developmental study of *Aloe vera* in the treatment of Cancer and AIDS. In future, controlled studies are required to prove the effectiveness of *Aloe vera* under various Condisitions. As an essential part of the herbal medicine, *Aloe vera* has enjoyed a very prominent position in the eastern medicinal practice. But, in the recent times, *Aloe vera* research studies have confirmed some of the well known benefits of this plant much to the relief of the westerners who have been hesitating to use it as an effective home remedy. This article presents some of the researched facts on the benefits of *Aloe vera*.

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