



A Review Article on: Aloe Vera : Extraction of Gel and Extraction of Aloin From Aloe Vera Gel by Ultrasonic Assisted Method

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Abstract:

Aloe vera belongs to the family Xanthorrhoeaceae commonly known as GhritKumari, is the oldest medicinal plant ever known and the most applied medicinal plant worldwide. Phytochemistry of aloe Vera gel has revealed the presence of more than 200 bioactive chemicals. Aloe Vera gel is extracted from its leaves and appropriate processing techniques are needed for stabilization as well as preparation of the end products. Use of Aloe Vera in nutritional, pharmaceutical and cosmetic preparations draw attention for generation of scientific information. In this review paper, different processing aspects like extraction of gel and extraction of aloin were critically described from different references. Aloin is main chemical constituent in Aloe Vera which is anthraquinone. It is a yellow colour compound is mixture of two diastereoisomers, aloin A and Aloin B. It has powerful laxative properties. It is used as ingredients of various laxative pharmaceutical preparations. Ultrasound assisted extraction intensifies the kinetic of the extraction process by acting upon the interfacial area, through the disintegration of particles compared with batch extraction, it improves the extraction process decreasing both extraction time and temperature while increasing the rate of extraction. UAE technique was used to obtain active principal aloin from a herbal plant aloe vera. methanol was selected as organic solvent as found maximum extraction of aloin with it. the active principle aloin was quantified using WATER's HPLC system. 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, also acts as extremely powerful laxative.

Keyword: chemical components, extraction of gel, processing, extraction of aloin, uses, etc.

Introduction:

Medicinal plant has specific property and specific use owing to their biological group of compounds. Several species of the genus aloe has been in use under the common name of aloe viz. Aloe Vera, Aloe barbadensis, Aloe ferox, Aloe chinensis, Aloe indica, Aloe peyrii, etc. Amongst these Aloe Vera Linn syn. Aloe barbadensis Miller is accepted unanimously as the correct botanical source of aloe. Aloe Vera Gel is the colorless mucilaginous gel obtained from the parenchymatous cells in the fresh leaves of Aloe Vera (L) Burm. f. Aloe Vera Latex (Aloin, a bitter tasting purgative, is destructive to healthy tissue and cells) is obtained from specialized cells known as pericyclic tubules that occur just beneath the epidermis or rind of the leaves. Aloe

Veraplants products are biologically active and hence their post harvest handling and processing needs great care. The time, temperature and sanitation are the prime requirement for processing to put the Aloe Vera products in active form. The most important factor is the how to extract the gel from Aloe Vera leaf and to preserve it for long duration for its utilization in cosmetic and pharmaceutical products.

Aloin is an anthraquinone glycoside. It has molecular weight 418, molecular formula C₂₁H₂₂O₉ and its chemical structure is shown in Fig. Its IUPAC name is 8-Dihydroxy-10-(β-D-glucopyranosyl)-3-hydroxymethyl)-9(10H)-anthracenone. It is yellow-brown compound estimated at levels from 0.1 to 0.66 % of leaf dry present in cells adjacent to the rind of the leaf in gel. It is used as laxative agent to maintain digestion system treating constipation by inducing bowel movements. Once ingested, it increases peristaltic contractions in the colon, and induces bowel movements.

Ultra Assisted extraction (UAE):

Several reviews on application of UAE have been published in the past to extract bioactive compounds from herbs, Plant origin metabolites, saponins, steroids and triterpenoids. Ultrasonic field enables generation of microcavitations in the liquid surrounding the plant material. The effects are mechanical disruption of the cell wall releasing its content and local heating of the liquid, increasing the diffusion. The kinetic energy and ultrasound induce in the whole volume following the collapse of cavitation bubbles at solid-liquid interfaces thus improving the mass transfer across it. Aloe was originated in tropical Africa and it is now cultivated in warm climatic areas of Asia, Europe and America. Presently, the use of Aloe Vera has gained popularity because of herbal movement initiated by naturopaths, yogis, alternative medicine promoters and holistic healers. The industry size for Aloe raw material is estimated to be about \$125 million dollars. The product claims must be tested by intensive clinical trials, verified and certified by the Government regulatory authorities to build consumer confidence and safety of the Aloe Vera products. Volume of the industry for finished products containing Aloe Vera is alleged to be around \$110 billion dollars.

Botany of Aloe Vera:

Aloe Vera is a spiky cactus like xerophytes. It is a clump forming perennial plant with thick fibrous root which produces large basal leaves, usually 12–16 per plant, weighing up to 1.5 kg when mature. The plant matures when it is about 4 years old and has a life span of about 12 years. The leaves are up to 0.5 m long and 8–10 cm across at the base, tapering to a point, with saw-like teeth along their margins. In a transverse section, the plant shows a slightly concave appearance on the adaxial surface and distinctly convex appearance on the lower abaxial surface. The leaves are covered with thick cuticle, beneath which epidermis and mesophyll are present. Later is differentiated into upper chlorenchyma and lower parenchyma, as the rosette matures, successive leaves have fewer whitish spots and grey-greenish in color. The plant is practically disease free, occasionally black spots may occur on upper surface because of fungal infection or soft rotting may damage whole plant. The causal organism for soft rotting is a bacterium. There are over 550 species of Aloe grown world over. However, only two species are grown commercially i.e. *Aloe barbadensis* Miller (Aloe Vera) and *Aloe arborescens* Miller. There are at least two other species that have medicinal properties namely *Aloe Perrybaker* and *Aloe ferox*. Most Aloe Vera plants are non toxic but a few are extremely poisonous containing a hemlock like substance. *Aloe variegata* is a dwarf species which is only a few centimeter in diameter and is a popular house plant.

Phytochemistry of Aloe Vera:

There are as many as 200 different types of molecules in Aloe Vera (21). The Aloe Vera leaf gel contains about 98% water. The total solid content of Aloe Vera gel is 0.66% and soluble solids are 0.56% with some seasonal fluctuation. On dry matter basis Aloe gel consists of polysaccharides (55%), sugars (17%), minerals (16%), proteins (7%), lipids (4%) and phenolic compounds (1%). The Aloe Vera gel contains many vitamins including

the important antioxidant vitamins A, C and E. Vitamin B1 (thiamine), niacin, Vitamin B2 (riboflavin), choline and

folic acid are also present. Some authors also suggested the presence of vitamins B12 (cyanocobalamin) in trace

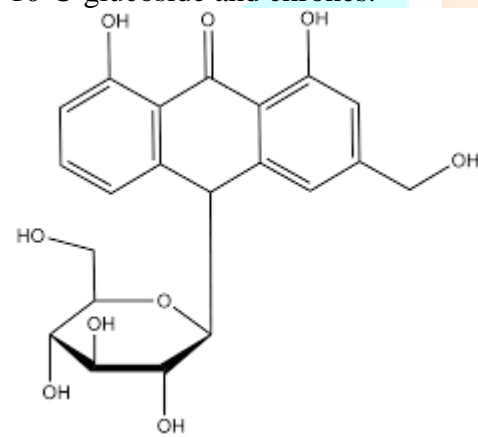
amounts which is normally available in animal source. Carbohydrates are derived from mucilage layer of the plant under the rind, surrounding the inner parenchyma or gel. They comprise both mono and polysaccharides. most important are the long chain polysaccharide The viscosity of gel reduces upon hydrolysis of these sugars. When taken orally some of the sugars bind to receptor sites that line the gut and form a barrier, possibly helping to prevent 'leaky gut syndrome'(s, comprising glucose and mannose, known as the glucomannans.)

Active Ingredients:

Leaves have three layers.

Outer protective layer of leaf

The outer most layer consist of The bitter yellow latex of pericyclic tubules in the outer layer of the leaves contain derivatives of hydroxyanthracene, anthraquinone and glycosides aloin A and B from 15% - 40% in different investigations. The other active principles of Aloe include hydroxyanthrone, alo- emodin-anthrone 10-C-glucoside and chrones.



Aloin

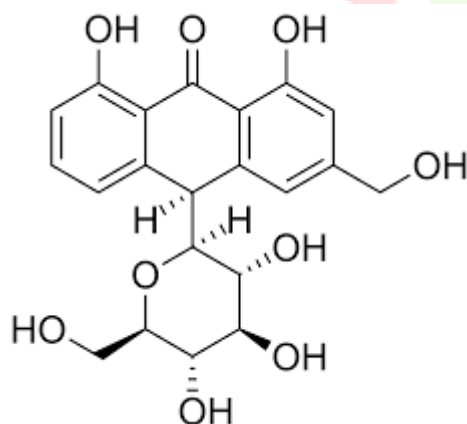
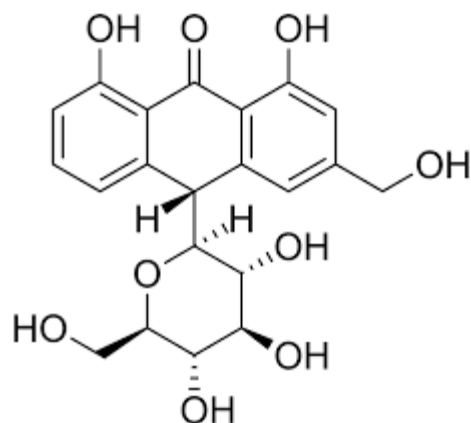


Fig No.4: Aloin A



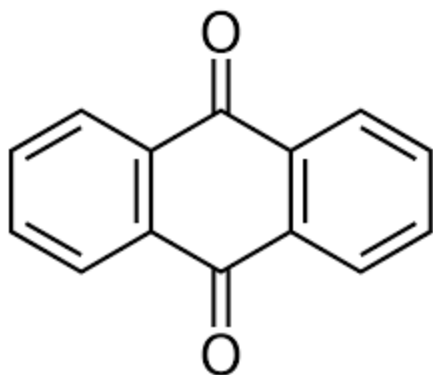
Aloin B

Middle Layer of Leaf

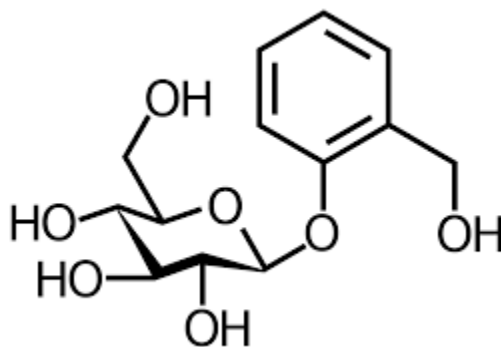
The bitter yellow latex containing anthraquinones and glycosides has been reported from the middle layers of cyclic acids, and amino acids. The juice that is originated from cells of the pericycle and adjacent leaf parenchyma, flowing spontaneously from the cut leaf get dried with or without the aid of heat and get solidified should not be confused with Aloe Vera gel which is also the colorless mucilaginous gel that is obtained from the parenchymatous leaf cells. 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.

Inner Layers of Leaf

The innermost layer of leaf gel contains water up to 99%, with glucomannans, amino acids, lipids, sterols and vitamins. Structure It has numerous monosaccharides and polysaccharides; vitamins B1, B2, B6, and C; niacinamide and choline, several inorganic ingredients, enzymes (acid and alkaline phosphatase, amylase, lactate dehydrogenase, lipase) and organic compounds (aloin, barbaloin, and emodin) as described.



Structure Of Anthraquinon



Structure Of Glycoside.

Processing of Aloe Vera leaf:

Washing of Aloe Vera leaf:

When Aloe Vera leaves are harvested, it contains dirt and other impurities. The yellow fluid secretion from the harvested leaves should be completely removed from the leaf for its processing and purity of products. The leaves were thoroughly washed with fresh water with mechanical washer. In the Aloe Vera processing industry, leaves are initially washed in a sterilizing solution, a 200 ppm solution of sodium hypochlorite. If leaves are extremely muddy when delivered to the gel factory they are pre-washed in a basin of deionised water.

Pre-treatment for Aloe Vera processing:

The Aloe Vera leaves are preconditioned by sun drying, shade drying and by steaming. The study revealed that, two days sun or shade drying, yielded highest crude gel recovery and lesser residual time without aloin content as compared to the fresh leaves gel. They have also revealed that the matured leaves lead more crude gel recovery as compared to immature leaves. The immature leaves take more time in processing by manually as well as mechanically for gel extraction.

Peeling of Aloe Vera leaf:

The removal of outer skin and rind is the most tedious operation for mechanical machine due to the shape of Aloe Vera leaf. Precautions should be taken to avoid contamination of inner part with exudates secretion to maintain purity of products.

Hand filleting:

In order to avoid contaminating the internal fillet with the yellow sap, the lower portion i.e. 25 mm of the leaf base (the white part attached to the large rosette stem of the plant), the tapering point (50 – 100 mm) of the leaf top, and the short, sharp spines located along the leaf margins are removed by a sharp knife. The hand – filleting method of processing Aloe leaves was developed to avoid contaminating the internal fillet with the yellow sap. In this method the rind is removed by using sharp knife, keeping anthraquinone level low, but in this process the most of the mucilage is left on the working table. The knife is then introduced into the mucilage layer below the green rind to remove top rind and similarly the bottom rind is removed.

Mechanical filleting method:

Mechanical filleting is the most commonly used method in the industry for gel extraction from the Aloe vera leaves (O'Brien, 2005). This process takes place on a conveyor belt, equipped with rollers and blades. Initially, the leaf (upper surface facing downwards) is passed over a blade mounted on a table. The next step in gel processing is the removal of cellular material from the gel. The gel fillets are chopped into small chips and de-pulped using sieves. It can also be liquidized as in the fruit juice industry and filtered to remove cellular material. The treatment with activated charcoal ensures that any anthraquinone compounds in the gel are removed. In the A. Vera industry, 0.05 % w/v charcoal is added to 2000 L gel, approximately gel takes one hour to pass through Celite Filter aid for filtration.

Whole leaf Aloe Vera processing:

This whole leaf process employed in the making of aloe juice allows the cellulose (skin) to be dissolved, as well as measurable amounts of aloin to be removed. This total procedure is done entirely by a cold process treatment. Maximum efficiency is thus assured, resulting in a product rich in polysaccharides. In this process, the base and tip are removed as previously delineated and then the leaf is cut into sections and ground into particulate slurry. The method for producing whole leaf Aloe Vera begins by placing the whole leaf in a Fitz Mill grinding unit that pulverizes the entire leaf into a soup-like structure. The material is then treated with special chemical products which break down the hexagonal structure of the fillet releasing the constituents, by means of a series of coarse and screening filters, or passage through a juice press, the rind particles are

removed, the expressed juice is then passed through various filtering columns which remove the undesirable laxative agents. This liquid is then pumped into large, stainless steel holding tanks that have been thoroughly cleaned and sanitized. Once the tank is filled, it is hooked-up to a depulping extractor. This machine removes the large pieces of pulp and leaves that the initial grinding process developed. The result is the separation of the Aloe Vera liquid and the pulp, which consists of the particles of Aloe leaf that have been ground and the naturally occurring pulp in the Aloe

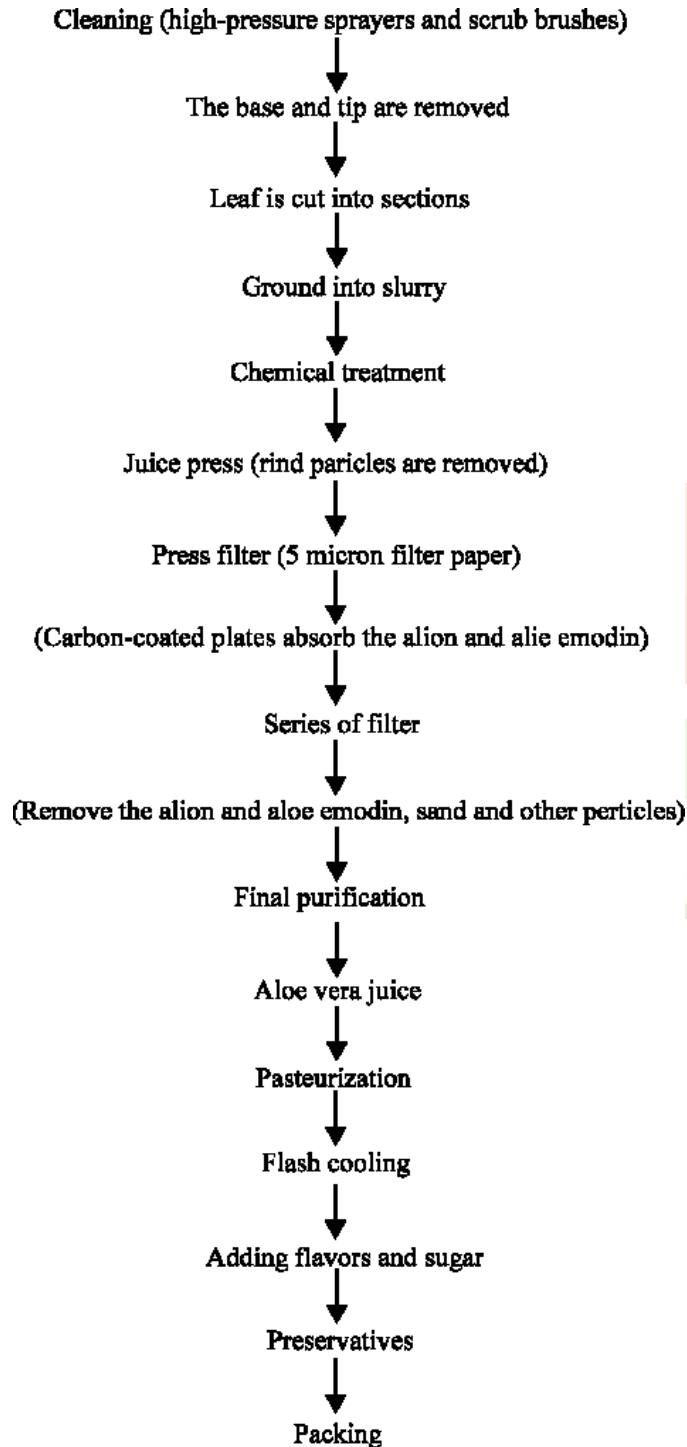


Diagram Of Whole Leaf Aloe Vera Processing

Roller squeezing method

In this method of peeling the Aloe Vera leaf is passed between two parallel rollers rotating in opposite direction and at different speed. The pair of rollers with variable apertures are arranged to accommodate the varying width and thickness of the Aloe Vera leaf. The purity is not maintained in this method of peeling as there is mixed of outer exudates with inner pulp. In the roller method of gel expulsion, the leaves are passed through rollers and the fillet "pops" out, same time more pressure is applied to the pericyclic tubules for gel expulsion. A 60 – 80 kg leaves/h capacity, Aloe Vera gel (fillet) extractor was designed and developed by providing adjustable gap in between the crushing rollers, so that only the gel is just extracted and over crushing of the leaves can be avoided (Anonymous, 2008d). An apparatus for extraction of uncontaminated Aloe Vera gel from the leaves of Aloe Vera plants had developed in which the harvested leaves of the Aloe Vera plants are placed between a pair of endless moving belts. The leaves are passing through a number of crushing rollers arranged in a desired pattern. The rollers first crush the core of the leaf to enable the gel to flow internally while a second set of rollers extrudes the gel from the leaf. The crushed leaf and extruded gel is then fall on a drain grate to enable gravity flow for the separation of gel from the crushed leaves. The leaves are removed from the gel collection area before it mixes with the flowing aloin to avoid contamination.

Aloe Vera leaf splitter:

Aloe Vera leaf splitter is very advance method of peeling in which, leafs are splitted by mechanical machines that simulates hand filleting operation. A thin wire is used to split the Aloe Vera leaf, which can be placed at varying distances from the vascular bundles. The wire is allowed to go too close to the rind, the extracted gel will contain more anthraquinone as well as more of the mucilage, if it is too close to gel fillet, and then less anthraquinone as well as less mucilage will be obtained. Aloe Vera plant leaf to a cutting knife of developed apparatus. The apparatus is designed to transport the leaf on an endless belt conveyor on which the leaf is laid down flat and lengthwise on the conveyor belt. A second endless belt conveyor travels in the same direction and at the same speed as the first endless belt conveyor but is disposed at a right angle to the first endless belt conveyor at the feed end of the apparatus. The first endless belt conveyor in its travel is slowly twisted towards the second endless belt conveyor and by the time the first endless belt conveyor has reached the end of its travel, the leaf has been turned from a flat condition to a vertical position and is sandwiched between the two sets of endless conveyor belts. Aloe vera gel extracting apparatus, which consists of a body, transmission system, peeling device and a driving mechanism. The transmission system comprises an upper and a lower part. The upper part of the system connected to the body through the belt sheave axle at the right end and the belt sheave axle at the left end connected to the hanger trestle in synchronous vertical movement with it. The lower part of the system connected to the body at both ends through the sheave axles. The peeling device consists of an edge cutting blade and a peeling blade. The edge of cutting blade is set in the slot between the two groups of belt. The upper peeling blade is connected to the hanger trestle and the lower peeling blade is connected directly to the body.

Gel extraction process from Aloe Vera pulp

The gel extraction from Aloe Vera leaves, had been carried out by removing of its exudates and its mucilage was scraped out with blunt edged knife. This mucilage was stirred vigorously in a blender to make it uniform. This uniform solution was extracted for cold- extracted gel (CEG) and hot extracted gel.

Cold extracted gel (CEG):

This solution was acidified with Hydrochloric acid (HCL) having pH 3.50 and the crude gel were precipitated out from the extract by adding slowly 95 % alcohol while stirring. The gel was obtained by centrifugation.

Hot extracted gel (HEG):

Material left after passing the blended solution through muslin cloth, was repeatedly treated with hot water until the complete extractions of gel was affected. The crude gel (HEG) was

prepared

Gel extraction by Centrifugation:

In this method the whole leaf after removal of the 'peel' the colorless hydroparenchyma was ground in a blender and centrifuged at 10,000 x g for 30 min at 4 0C to remove the fibers. Two other patented processes to obtain gel are commonly used in the aloe industry. The first is a method to extract gel polysaccharides by alcohol precipitation. A developed process for extraction of gel by manual peeling of leaf and principle of centrifugation applied.

Purification of Aloe Vera gel:

The next step in gel processing is the removal of cellular material from the gel. Gel fillets are chopped into small chips and de-pulped using sieves. Gel fillets can also be liquidized as in the fruit juice industry and filtered to remove cellular material. After removal of the fibre, only the liquid gel remains. The gel in this crude form is sold as a commercial product, but may also be mixed with activated charcoal, filter pressed, stabilized (preserved) and dried. Treatment with activated charcoal ensures that any anthraquinone compounds in the gel are removed. In the A. Vera industry, 0.05 % w/v charcoal is added to 2000 L gel.

Processing of aloe vera gel:

Reception of raw materials:

The Aloe vera leaves after harvesting were preferably transported in refrigerated vans from the field to the processing place. The leaves should be sound, undamaged, mold/rot free and matured (3-4 years) in order to keep all the active ingredients in full concentration. However, the composition of these active ingredients are subtly affected by seasonal, climatic and soil variations. One important factor that must be considered is the handling/treatment of the leaves after its harvesting because the decomposition of the gel matrix occurs on cutting due to natural enzymatic reactions and the activity of bacteria that are normally present on the leaves. This degradative process can adversely affect the quality of the end product. Therefore, there is a need to carefully work towards refrigerating the freshly removed leaves within 4-6 h or get the raw material directly into production.

Filleting operation:

The losses of biological activity appeared to be the result of enzymatic activity after the aloe leaf was removed from the plant. In fact, it was shown that the aloe gel, once extracted from the leaf, had greater stability than the gel left in the leaf. In order to avoid the decomposition of the biological activity, the filleting operation must be completed within 36 h of harvesting the leaves. In the other hand, the anthraquinone was one important factor leading to non enzymatic browning in aloe gel product.

Grinding/homogenization:

The major steps in this process include crushing or grinding. The aloe gel fillets should be crushed and homogenized using a commercial high speed tissue crusher at room temperature (25C). Due to the reaction of enzymatic browning, the longer the crushing/grinding time, the higher the browning index in Aloe vera gel juice. Therefore, crushing or grinding should be shortened within 10-20 min in order to avoid the enzymatic browning reaction of Aloe Vera gel.

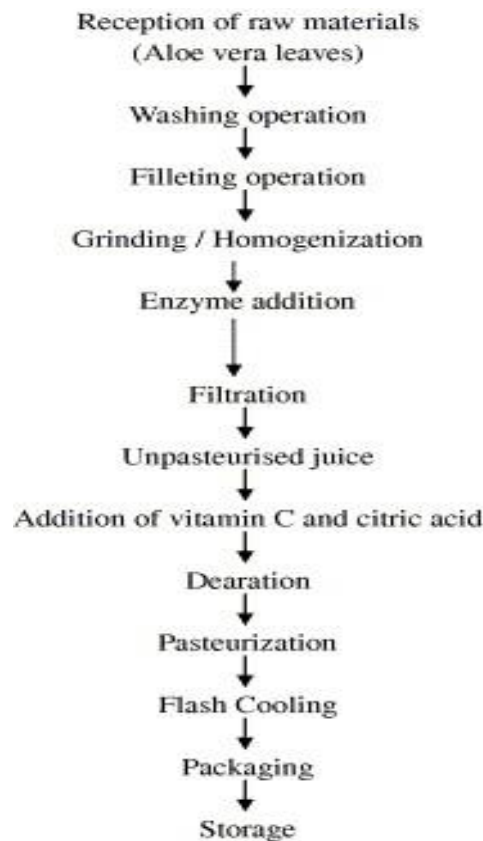


Fig No. 11: Diagram Of Grinding/Homogenization

Addition of pectolytic enzyme:

Enzymatic treatment of Aloe Vera gel for a long duration prior to processing is detrimental to biologically active compound such as polysaccharide which is the single most important constituent in aloe. Many researches have been done on the polysaccharides. It has been reported that the enzyme treatment at 50C and within 20 min did not induce the loss of biological activity of polysaccharide in Aloe Vera gel.

Filtration:

This operation influences on the stability of Aloe Vera gel juice. For example, the product showed the sedimentation of particles as the filtration operation lost its control.

Addition of vitamin C and citric acid:

The unpasteurized aloe gel juice was fortified with vitamin C and citric acid to avoid browning reaction, to improve the flavor of Aloe Vera gel juice and to stabilize the juice. The pH of aloe gel juice was adjusted between 3.0 and 3.5 by adding citric acid to improve the flavor of Aloe Vera gel juice.

Addition of preservatives and stabilizers:

In all the processing techniques, preservation can be achieved by the addition of chemical preservatives and other additives. Stabilizing agent is added in aloe products to prevent sedimentation of juice upon storage. In an investigation the aloe Vera gel was mixed with sulphited polysaccharides isolated from the red microalgae, guar gum and xanthan gum. Rheological studies indicated interaction of aloe vera gel with algal polysaccharides and xanthan gum which is depicted by increased apparent viscosities, yield points and in some cases hysteresis but these interactions were not observed with guar gum.

Cold processing:

In the cold processing technique, the entire processing steps are accomplished without the application of the heat. The use of enzymes, like glucose oxidase and catalase to inhibit the growth of aerobic organisms within aloe vera gel and thereby sterilizing it has been reported. Other sterilization steps reported in the cold processing include exposing the gel to ultraviolet light followed by micron filtration.

Hot processing and flash cooling:

In hot processing, sterilization is achieved by treating the aloe liquid with the activated carbon at high temperature. This step may affect the taste, appearance and the biological activity of aloe gel products. Biological activity of aloe Vera gel essentially remains intact when gel is heated at 65 °C for a period less than 15 min. Extended periods or higher temperatures greatly reduce activity levels. After heat treatment, the juice is flash cooled to 5 °C or below within 15 s to preserve biological activity.

Deaeration:

The aim of deaeration step is to avoid the oxidation of ascorbic acid, which eventually improves the shelf life of the Aloe Vera gel juice.

Pasteurization:

Like the process of other vegetable juice, this step may affect the taste, appearance and the content of biological activity of aloe gel product. HTST treatment (at 85-95°C for 1-2 min) is an effective method to avoid the bad flavor and the loss of biological activity of the Aloe Vera gel.

Storage:

Relative humidity and temperature are two most important environmental parameters that affect product quality. Those two parameters can also affect the amount of the volatile substances of the juice absorbed by the packaging material and consequently, affect the shelf-life of the product.

Therapeutic Use**1. Wound Healing :**

Wound healing is a dynamic process, occurring in 3 phases. The first phase is inflammation, hyperaemia and leukocyte infiltration. The second phase consists of removal of dead tissue. The third phase of proliferation consisting of epithelial regeneration and formation of fibrous tissue. The wound healing property of Aloe Vera gel has been attributed to Man-nose-6-phosphate. Actually, glucomannan and plant growth hormone gibberellins interact with growth factor receptors of fibroblast and stimulate its activity and proliferation for increases collagen synthesis in topical and oral administration of Aloe according to Hayes. The Aloe administration influence collagen composition (more type III) and increased collagen cross linking for wound contraction and improving breaking strength. It also increases synthesis of hyaluronic acid and dermatan sulfate in the granulation tissue of a healing wound.

2. Anti-Inflammatory Action :

The anti-inflammatory activity of Aloe Vera gel has been revealed by a number of in vitro and in vivo studies through bradykinase activity. Fresh Aloe Vera gel significantly reduced acute inflammation in rats (carrageenin-induced paw oedema), but not in chronic inflammation. In croton oil-induced oedema in mice, three Aloe Vera sterols were able to reduce inflammation by up to 37%. Lupeol, the most active anti-inflammatory sterol, reduced inflammation in a dose dependent manner. Other aspirin-like compound present in Aloe is responsible for anti-inflammatory and antimicrobial properties. Even, Aloe Vera extract (5.0% leaf homogenate) decreased inflammation by 48% in a rat adjuvant-induced arthritic inflammatory mode.

3. Effects on the Immune System :

Alprogen inhibit calcium influx into mast cells, thereby inhibiting the antigen-antibody-mediated release of histamine and leukotriene from mast cells. Several low-molecular-weight compounds are also capable of inhibiting the release of reactive oxygen free radicals from activated human neutrophils.

4. Moisturizing and Anti-Aging Agent :

Mucopolysaccharides help in binding moisture into the skin. The amino acids also soften hardened skin cells and zinc acts as an astringent to tighten pores. Its moisturizing effects have also been studied in treatment of dry skin associated with occupational exposure where Aloe Vera gel gloves improved the skin integrity, decrease appearance of acne wrinkle and decrease erythema . The Aloe gel gives cooling effect and also acts as a moisturizing agent. It also has role in gerontology and rejuvenation of aging skin. This property of Aloe is because it's biogenic material. Aloe Vera is used as skin tonic in cosmetic industry.

5. Antitumor Activity :

A number of glycoproteins present in Aloe Vera gel have been reported to have antitumor and antiulcer effects and to increase proliferation of normal human dermal cells. An induction of glutathione S-transferase and an inhibition of the tumor-promoting effects of phorbol myristic acetate has also been reported which suggest a possible benefit of using aloe gel in cancer chemoprevention.

6. Laxative Effects:

Anthraquinones present in latex are a potent laxative; it's stimulating mucus secretion, increase intestinal water content and intestinal peristalsis .After oral administration aloin A and B, which are not absorbed in the upper intestine, are hydrolyzed in the colon by intestinal bacteria and then reduced to the active metabolites (the main active metabolite is aloe-emodin- 9-anthrone) , which like senna acts as a stimulant and irritant to the gastrointestinal tract . 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

Medicinal Uses .

1. Cosmetic & 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. Mixed with selected essential oils, it makes an excellent skin smoothing moisturizer, sun block lotion plus a whole range of beauty products. Due to its soothing and cooling qualities Maharishi Ayurveda recommends Aloe Vera for a number of skin problems. Aloe Vera extracts have antibacterial and antifungal activities, which may help in the treatment of minor skin infections, such as boils and benign skin cysts and have been shown to inhibit the growth of fungi that cause tinea. Some researcher has been reported the contact dermatitis and burning skin sensations following topical applications of Aloe Vera gel to dermabraded skin. These reactions appeared to be associated with anthraquinone contaminants in this preparation.

2. Antiseptic :

The antiseptic property of Aloe Vera is due to presence of six antiseptic agents namely lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulphur. These compounds have inhibitory action on fungi, bacteria and viruses. Though most of these uses are interesting controlled trials are essential to determine its effectiveness in all diseases .

3. Anti Diabetic

The five phytosterols of A. Vera, lophenol, 24-methyl- lophenol, 24-ethyl-lophenol, cycloartanol and 24-methyl- lenecycloartanol showed anti-diabetic effects in type-2 diabetic mice. Aloe Vera contains polysaccharides which increase the insulin level and show hypoglycemic properties. Traditional anti-diabetic plants might provide new oral anti-diabetic compounds, which can counter the high cost and poor availability of the current medicines for many rural populations in developing countries

4. Anticancer Properties:

The role of Aloe in carcinogenicity has not been evaluated well. The chronic abuse of anthranoid containing laxatives has been hypothesized to play a role in colorectal cancer, however, no causal relationship between anthranoid laxative abuse and colorectal cancer. Aloe Vera juice enables the body to heal itself from cancer and also from the damage caused by radio and chemotherapy that destroys healthy immune cells crucial for the recovery. Aloe Vera emodin, an anthraquinone, has the ability to suppress or inhibit the growth of malignant cancer cells making it to have antineoplastic properties has been demonstrated and

5. Stress

Aloe juice is helpful in smooth functioning of the body machinery. It reduces cell-damaging process during stress condition and minimizes biochemical and physiological changes in the body. Oxidative stress refers to chemical reactions in which compounds have their oxidative state changed. Aloe Vera is an excellent example of a functional food that plays a significant role in protection from oxidative stress.

996. Adverse Reactions:

Abdominal spasms and pain may occur after even a single dose and overdose can lead to colicky abdominal spasms and pain, as well as the formation of thin, watery stools. Chronic abuse of anthraquinone stimulant laxatives can lead to hepatitis and electrolyte disturbances (hypokalaemia, hypocalcaemia), metabolic acidosis, malabsorption, weight loss, albuminuria, and haematuria. Aloe should not be used during pregnancy or lactation except under medical supervision after evaluating benefits and risks. Aloe is also contraindicated in patients with cramps, colic, hemorrhoids, nephritis, or any undiagnosed abdominal symptoms such as pain, nausea, or vomiting. Leaf anti-hyperglycemic activity with protective effect on pancreas, liver and small intestine in rabbits was studied.

Antimicrobial Activities

1. Antibacterial Activity:

Aloe Vera gel was bactericidal against *Pseudomonas aeruginosa* and acemannan prevented it from adhering to human lung epithelial cells in a monolayer culture. A processed Aloe Vera gel preparation inhibited the growth of fungus *Candida albicans*. The gel contains 99.3% of water, the remaining 0.7% is made up of solids with carbohydrates constituting for a large component. Concentrated extracts of Aloe leaves are used as laxative and as a haemorrhoid treatment. Aloe gel can help to stimulate the body's immune system. Glucomannan and acemannan have been proved to accelerate wound healing, activating macrophages, stimulating immune system as well as antibacterial and anti-viral effects

2. Antiviral Activity :

Several ingredients in Aloe Vera gel have been shown to be effective antiviral agents. Acemannan reduced herpes simplex infection in two cultured target cell lines. Lectins, fractions of Aloe vera gel, directly inhibited the cytomegalovirus proliferation in cell culture, perhaps by interfering with protein synthesis. A purified sample of aloe emodin was effective against infectivity of herpes simplex virus Type I and Type II and it was capable of inactivating all of the viruses, including varicella-zoster virus, influenza virus, and pseudo rabies virus. The anthraquinone aloin also inactivates various enveloped viruses such as herpes simplex, varicella-zoster and influenza.

3. Antifungal Activity:

Aloe juice has anti-inflammatory, anti-arthritis activity, antibacterial and hypoglycemic effects. For bacteria, inner leaf gel from Aloe Vera was shown to inhibit growth of Streptococcus and Shigella species in vitro. Another constituent of Aloe Vera includes saponins. These are soapy substances from the gel that are capable of cleansing and having antiseptic properties. The saponins perform strongly as anti-microbial agents against bacteria, viruses, fungi and yeasts.

Conclusion:

A review from different cited references on processing of Aloe Vera leaf gel has revealed some useful information. Aloe Vera plant has potential in pharmaceutical, nutritional and cosmetic industries. The leaf of Aloe Vera plant contains biologically active compounds, which need careful harvesting and handling. Temperature is the main factor for processing of Aloe Vera and particularly gel extraction process. A review on processing of Aloe Vera leaf gel has revealed Aloe Vera as a highly potential functional and valuable ingredient that exhibits relatively impressive biological functions of great interest in cosmetic, pharmaceutical and food industries. The active ingredients hidden in its succulent leaves have the power to soothe human life and health in a myriad of ways. The plant has importance in everyday life to soothe a variety of skin ailments such as mild cuts, antidote for insect stings, bruises, poison ivy and eczema along with skin moisturizing and anti-aging, digestive tract health, blood and lymphatic circulation and functioning of kidney, liver and gall bladder makes it a boon to human kind.

Aloe Vera as the "wonder plant" are multiple from being an antiseptic, anti-inflammatory agent, helps in relieving like cancer and diabetes, and being a cosmetic field. The plant is in need to a greater research emphasis for better utilization of this plant for human-kind. 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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