

Formulation And Evaluation of Aloe Vera Gel

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Abstract

Aloe Vera, commonly known as Barbados or Curacao Aloe, is an herbal medicine with along tradition of use by a variety of cultures. The succulent plant grows in arid and subtropical climates and is best known for distinct preparations: the clear mucilaginous gel that is widely used for the treatment of minor burns, especially sunburns, and the thick sap of the leaves that turns yellow-brown and has strong laxative effects that caution its use

The efficacy of aloe Vera gel to treat burn wounds, genital herpes, and seborrhoea dermatitis have been shown in clinical trials, but other indications such as psoriasis or internal application for the treatment Several clinical trials are being conducted to further evaluate the use of aloe Vera gel for a variety of disorders, as well as to further confirm traditional uses of the plant extract. Aloe Vera gel, derived from the succulent plant Aloe Vera, has been widely used for its medicinal, cosmetic, and therapeutic properties. Rich in bioactive compounds such as vitamins, minerals, amino acids, and antioxidants, it is primarily known for its skin- healing, anti- inflammatory, and moisturizing effects. Aloe Vera gel is commonly used in the treatment of burns, wounds, skin irritations, and as a natural moisturizer.

Keywords: Aloe Vera gel, Aloe Vera, Barbados, dermatology.'

1. Introduction

People have known about and used the Aloe Vera plant for hundreds of years since it is good for health, beauty, medicine, and skin care. The term Aloe Vera comes from the Arabic word "Aloe," which means "shining bitter substance," and the Latin word "Vera," which means "true." Greek scientists thought Aloe Vera was the cure for everything 2000 years ago. The Egyptians termed Aloe "the plant that never dies." Today, dermatologists use the Aloe Vera plant for a number of things.

People have most often used aloe to treat burn wounds, specifically to help them recover faster, minimize swelling, and prevent scarring of the tissue. Disorders said that the gel might be used to treat wounds and mouth infections, stop itching, and heal sores. Reports of aloe vera gel's positive effects on radiation dermatitis led to its usage as a home medicine in the United State.

Most Aloe plants are not harmful, however others are quite harmful. There are roughly 420 varieties of aloe, but only four of them offer medical benefits Aloe Vera's natural distribution is not obvious because the plant has been grown all ov The leaves have three layers: an inner gel, a yellow sap, and a thick outer layer of 15 20 cells called the rind 3, 8. Aloe leaves have been used for a long time in health foods, cosmetics, and medicine, but there is no clear scientific explanation for why they have these effects .



Figure 1: Aloe Vera Plant

Aloe vera gel is a natural substance extracted from the inner pulp of the leaves of the Aloe vera plant. This gel is widely recognized for its numerous health, cosmetic, and therapeutic benefits, which have been valued for thousands of years. The gel is clear, viscous, and contains a rich blend of bioactive compounds, including vitamins, minerals, enzymes, amino acids, and polysaccharides which contribute to its diverse healing properties.

Primarily used in topical applications, Aloe vera gel is known for its soothing, hydrating, and anti-inflammatory effects. It is commonly used to treat skin conditions such as burns, sunburns, cuts, rashes, and minor abrasions, due to its ability to promote skin healing and reduce redness and irritation. The gel's natural moisture-locking properties also make it a popular ingredient in moisturizers, creams, and lotions, particularly for dry or sensitive skin . Beyond its dermatological uses, Aloe vera gel has also been studied for its potential internal health benefits, such as improving digestive health, boosting the immune system, and controlling blood sugar levels.

While the gel is most commonly applied to the skin, it is also available in liquid form for oral consumption in many health supplements. Despite its long history of use in traditional medicine and

modern skincare, scientific research on Aloe vera gel is ongoing to better understand its full range of therapeutic properties, mechanisms of action, and potential side effects. As its popularity continues to grow, Aloe vera gel remains a versatile and trusted natural remedy in both the beauty and wellness industries.

Aloe vera gel, extracted from the inner parenchymatous tissues of the leaf, has a long tradition of use in both traditional and modern medicine. Its soothing, moisturizing, anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties make it an ideal candidate for formulating topical gels. However, despite its extensive use, there exists a compelling need to conduct focused studies on aloe vera gel formulation to overcome various limitations associated with its natural form and to optimize its potential in commercial product development.

Aloe vera (syn. *Aloe barbadensis* Mill, Fam. Liliaceae), also known Barbados or Curacao Aloe, has been used in traditional and folk medicines for thousands of years to treat and cure a variety of diseases. Although the plant is native to northern parts of Africa, it has rapidly spread across the world because its cultivation is easy. An important distinction has to be made between the strongly laxative and purgative latex derived from the bundle-sheath cells and the clear mucilaginous gel. The plant has been used by Egyptians, Assyrians, and Mediterranean civilizations, as well as in Biblical times. A variety of aloe species are still used in folk medicines of Africa and Asia.

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 “Alloch” 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.

Need for Herbal Gel Formulations:

Topical drug delivery systems are widely preferred because they provide direct application of therapeutic agents to the affected area. Gels are semisolid preparations that are easy to apply, non-greasy, and provide good patient compliance. Herbal gels are increasingly popular because they combine the advantages of topical formulations with the therapeutic benefits of natural ingredients.

The increasing demand for herbal cosmetics and skincare products has encouraged researchers to develop aloe vera-based formulations that are effective, stable, economical, and acceptable to consumers. Therefore, formulation and evaluation studies are essential for ensuring product quality, safety, and efficacy.

Advantages of Aloe Vera Gel:

1. **Moisturizing Property:** Aloe vera gel hydrates the skin and prevents dryness without making the skin oily.
2. **Anti-inflammatory Activity:** It reduces inflammation, redness, itching, and irritation.

3. Wound Healing Effect: Aloe vera promotes faster healing of cuts, burns, and wounds by stimulating collagen synthesis.

4. Antimicrobial Property: It inhibits the growth of bacteria and fungi, thereby preventing infections.

5. Cooling and Soothing Effect: The gel provides a cooling sensation and relieves sunburns and skin irritation.

6. Antioxidant Activity: Aloe vera contains vitamins and antioxidants that protect the skin from oxidative damage.

7. Anti-aging Effect: It improves skin elasticity and reduces wrinkles and fine lines. 8. Non-toxic and Safe: Aloe vera gel is generally safe for topical use and causes minimal side effects.

Composition of Aloe Vera Gel:

1. Water: Approximately 99% of the gel consists of water.

2. Polysaccharides: Acemannan and glucomannan promote wound healing and hydration.

3. Vitamins: Vitamins A, C, E, and B-complex act as antioxidants.

4. Minerals: Calcium, magnesium, zinc, potassium, and selenium support skin health.

5. Enzymes: Bradykinase reduces inflammation.

6. Amino Acids: Essential amino acids nourish the skin.

7. Anthraquinones: Possess antimicrobial and analgesic properties.

8. Saponins: Provide cleansing and antiseptic effects.

9. Salicylic Acid: Exhibits anti-inflammatory and antibacterial activity.

Evaluation Parameters of Aloe Vera Gel:

1. Physical Appearance : The gel is observed for colour, odour, texture, transparency, and consistency. A good aloe vera gel should be smooth, clear, and free from lumps.

2. pH Determination : The pH of the gel is measured using a pH meter. The pH should be compatible with skin pH to avoid irritation.

3. Homogeneity : The gel should be uniform without phase separation or aggregates.

4. Viscosity : Viscosity determines the consistency and flow property of the gel. Proper viscosity ensures easy application.

5. Spreadability : Spreadability indicates how easily the gel spreads on the skin surface.

6. Extrudability : This parameter evaluates the ease with which the gel can be removed from the container or tube.

7. Stability Study : The gel is stored under different temperature conditions to study changes in appearance, pH, and consistency over time

Applications of Aloe Vera Gel:

Aloe vera gel has numerous pharmaceutical and cosmetic applications:

Treatment of burns and wounds.

Acne and pimples management.

Skin moisturizing products.

Anti-aging creams and lotions.

Sunburn relief products.

Hair care preparations.

Antiseptic and antimicrobial gels.

Treatment of dry and irritated skin.

Its versatility and safety have increased its demand in herbal medicine and cosmetic industries.

Aim –

This study aims on the pharmaceutical assessment of aloe-vera by formulating and evaluating an herbal gel to treat skin conditions.

Objective-

1.To develop a stable, safe, and highly effective topical delivery system that preserves the plant's natural anti-inflammatory, moisturizing, and wound-healing properties while ensuring maximum skin compatibility and patient compliance.

2.Skin Healing and Care.

3.Antioxidant and Anti-inflammatory Benefits.

4.Immune System Support.

5.Safety and Efficacy Evaluation.

Plan of Work :**Phase I :**

Literature Review : - Study the medicinal and cosmetic importance of Aloe Vera.

Review different gel formulations and gelling agents.

Study evaluation parameters such as pH, viscosity, spread ability, stability, and antimicrobial activity.

Review previous research on Aloe Vera topical gels.

Phase II – Collection and Authentication of Plant Material

Collect fresh leaves of Aloe vera.

Wash thoroughly with distilled water.

Authenticate the plant material from a botanical department or pharmacognosy laboratory.

Phase III – Extraction of Aloe Vera Gel –

Remove the outer green rind carefully.

Collect the transparent mucilaginous gel

Filter the gel to remove fibres and impurities.

Store the extracted gel under refrigerated conditions.

Phase V – Formulation of Aloe Vera Gel :

Ingredients Used :

Aloe Vera extract

Carbopol 934/940 or other gelling agent

Glycerine - Propylene glycol

Methyl paraben/Propyl paraben

Triethanolamine - Distilled water

Materials and Methods:

Aloe vera gel is commonly extracted from the leaves of the Aloe vera plant. Here is a basic outline of the materials and methods typically used to prepare Aloe vera gel for various purposes, including cosmetic, medicinal, or skin care

Materials:

1. Fresh Aloe Vera Leaves - Typically mature, thick leaves of the Aloe vera plant are used.
2. Sharp Knife or Scissors - To cut the leaves.
3. Spoon or Scoop - To extract the gel from the leaves.
4. Blender (optional) - To smoothen the gel if needed.
5. Preservative (optional) - Such as vitamin E or citric acid, to prolong shelf life.
6. Strainer or Cheesecloth (optional) - To remove any leftover plant particles

Harvesting Aloe Vera Leaves

Select mature, healthy Aloe vera leaves from the outer section of the plant.

Use a sharp knife or scissors to cut the leaves at the base

Extracting Aloe Vera Gel

Wash the leaves thoroughly to remove dirt and any contaminants.

Trim off the spiky edges of the leaf on both sides using the knife.

Cut the leaf into smaller sections (about 4-5 inches long).

Use a spoon or scoop to carefully remove the clear, thick gel from inside the leaf

Discard the yellow latex sap (aloe latex) that may leak out from the cut parts, as it can be irritating to the skin.

Method:

Firstly, cut off the fresh aloe leaves from the plant.

After Cutting, Rinse the leaves by cold water.

Cut away the few portions from the bottom and wipe off any yellow gel.

Use a vegetable peeler or knife to Peel of the outer layer of leaves.

Take a Spoon or Knife and Scoop the gel out from the leaves

Place the aloe gel in a Mortar-pestle. - Homogenize the gel into the Mortar-pestle

Results and discussion:

Percentage Moisture Content:

Freshly extracted **aloe vera gel** has a moisture content ranging from **97% to 99.5% by weight**. The remaining 0.5% to 3% of the gel is primarily comprised of carbohydrates (including the polysaccharide acemannan), amino acids, vitamins, and minerals. Because the natural gel is almost entirely water, it is highly perishable. Commercial skincare formulas and soothing gels often have lower specified aloe concentrations (e.g., 90–92%), while dehydrated powders reduce the moisture content down to just 2% to 4% for longer shelf life.

Transparency, smoothness and weight on drying:

The 5 ml gel formulation taken in the 10ml test tube and visually checked for its transparency. The smoothness of the gel formulation was tested by rubbing between the fingers and observing whether the gel is smooth, clumped, homogenous or rough. The relative density of the formulation or weight/ ml of the formulation was determined by taking the weight in gm. of 10 ml formulation and 10 ml distilled water using RD bottle.

Table No. 1 Result of evaluation parameter of Herbal Aloe-Vera Skin Gel

Sr No	Test	Result
1.	Color	Slightly yellow
2.	Odour	Earthy and garlicky
3.	Texture	smooth
4.	State	Semi -solid
5.	Absorption test	Very well Absorbed
6.	Skin Irritancy test	No Irritancy effect
7.	Homogeneity	Good
8.	pH	6.5
9.	Spread-ability Test	Smooth
10.	Smoothness	Good

Conclusion:

Based on the above study, we can say that herbal gel is made for use in warm areas. Aloe vera is used in gels to make them work better together and to keep the skin wet. Herbal formulations are becoming more popular all over the world. It is a very good effort to make a herbal gel with Aloe vera, honey, turmeric powder. Aloe Vera makes the skin more wet and smooths out rough spots, cracks, and cuts. Due to its anti-inflammatory, anti-acne, anti-oxidant, anti-diabetic, nonirritant, and deeply penetrating qualities, aloe-vera gel helps nourish the skin and get it back to its normal position. It also has a soothing and moisturizing effect.

In the current study, it was observed that the formulation exhibited enhanced stability at room temperature and demonstrated favorable flow characteristics. This formulation exhibits compatibility with various skin types and demonstrates a lack of irritative effects. Furthermore, it nourishes and safeguards the skin against external environmental factors.

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