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Review Paper

A Review on Herbal Anti-Inflammatory Potential of Aloe Barbadensis Miller, Phyllanthus Emblica and Trigonella Foenum-Graecum

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ABSTRACT

Inflammation is a common physiological response associated with pain, redness, and swelling. Herbal medicines have gained significant attention due to their safety, effectiveness, and minimal side effects compared to synthetic drugs. The present study aims to formulate and evaluate a polyherbal anti-inflammatory cream containing natural ingredients such as Aloe barbadensis Miller, Phyllanthus emblica, and Trigonella foenum-graecum. Aloe barbadensis Miller possesses soothing and wound-healing properties, Phyllanthus emblica is rich in antioxidants and anti-inflammatory compounds, while Trigonella foenum-graecum exhibits antimicrobial and anti-inflammatory activities. The cream was prepared using suitable base materials through standard pharmaceutical methods. The formulated cream was evaluated for various physicochemical parameters including appearance, pH, spreadability, viscosity, homogeneity, stability, and skin irritation. The results indicated that the polyherbal formulation showed good consistency, stability, and compatibility with skin without causing irritation. The presence of combined herbal extracts may enhance the anti-inflammatory activity and promote skin healing. Thus, the developed polyherbal cream can be considered a safe and effective topical formulation for the management of inflammation and related skin conditions.

INTRODUCTION

Inflammation

Inflammation is a natural response of the body to injury, infection, or irritation, often characterized

by redness, swelling, pain, and heat. While synthetic anti-inflammatory drugs are widely used, they may cause side effects with long-term use, prompting interest in herbal alternatives. It is characterized by redness, swelling, heat, pain, and

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loss of function. Although inflammation is an essential defense mechanism, chronic or excessive inflammation may lead to various skin problems including dermatitis, irritation, and allergic

reactions. prolonged use of synthetic drugs may cause adverse effects such as skin irritation, allergic reactions, and systemic toxicity [1].

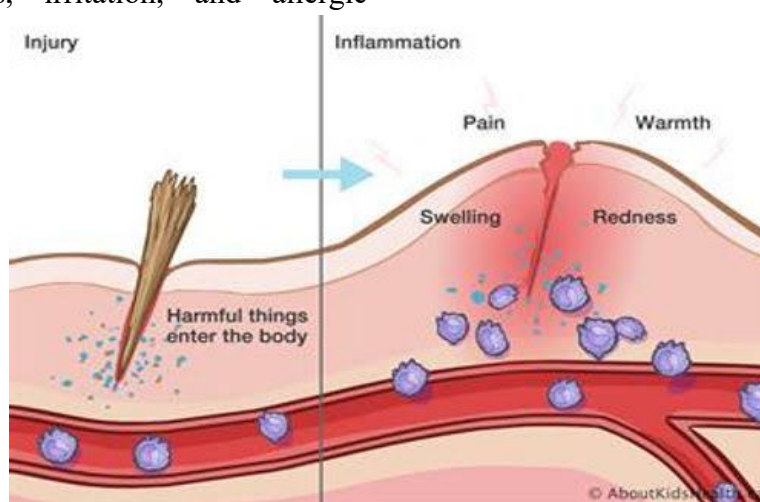


Fig.no.1 Inflammation

Aloe barbadensis Miller is a well-known medicinal plant used in traditional medicine for its soothing, moisturizing, wound-healing, and anti-inflammatory properties. It contains various bioactive compounds including vitamins, enzymes, amino acids, and polysaccharides that promote skin healing and reduce inflammation [8]. *Alma* (*Phyllanthus emblica*), rich in vitamin C and polyphenols, exhibits strong antioxidant and anti-inflammatory activity, helping in tissue repair and protecting skin from oxidative stress [5]. *Fenugreek* (*Trigonella foenum-graecum*) contains saponins and flavonoids that provide anti-inflammatory and analgesic effects, and it also promotes skin hydration [3]. These traditional medicines take part in a significant position in health services around the world. The opioids or non-steroidal anti-inflammatory drugs, widely used to reduce the inflammation of various types, possess severe side effects like redness, itching etc. As a result, a search for other alternatives seems to be necessary which would be more beneficial. Gel formulations are used to deliver the drug topically because of easy application,

increase contact time and minimum side effects as compare to other topical preparation and or administration Hence present study was aimed to prepare polyherbal gel for in-vitro anti-inflammatory activity. Inflammation is a natural and complex biological response that occurs in the body as a defense mechanism against harmful stimuli. It plays a crucial role in protecting the body from infections, injuries, and other threats. However, when inflammation becomes chronic or excessive, it can lead to various health issues. In this brief introduction, we'll discuss the causes, types, and treatment of inflammation [1, 2, 3]

Types of Inflammation:

Acute Inflammation: This type of inflammation is short-term and typically occurs as an immediate response to injury or infection. It involves symptoms like redness, swelling, pain, and heat at the affected site

Chronic Inflammation:

In contrast, chronic inflammation persists over a longer period and can be low-level. It is often associated with diseases like heart disease, cancer, and autoimmune disorders. Treatment of Inflammation: Inflammation [1]

Causes of Inflammation:

Infection: One of the most common causes of inflammation is the body's response to infections by bacteria, viruses, or other pathogens. This type of inflammation is often acute and necessary for the immune system to fight off the invading microorganisms.

Injury: Physical injuries, such as cuts, burns, or trauma, trigger inflammation as part of the healing process. This acute inflammation helps repair damaged tissues.

Autoimmune Disorders: In some cases, the immune system mistakenly attacks the body's own tissues, leading to chronic inflammation. Autoimmune diseases like rheumatoid arthritis and lupus fall into this category.

Chronic Conditions: Conditions like obesity, diabetes, and atherosclerosis can lead to low-level, chronic inflammation, which may contribute to the development of various diseases.

Environmental Factors: Environmental factors such as pollution, smoking, and exposure to allergens can also trigger inflammation [1, 2].

Treatment of Inflammation:

Inflammation is a natural and complex biological response that occurs in the body as a defense mechanism against harmful stimuli. It plays a crucial role in protecting the body from infections, injuries, and other threats. However, when inflammation becomes chronic or excessive, it can lead to various health issues. In this brief

introduction, we'll discuss the causes, types, and treatment of inflammation. **AntiInflammatory Medications:** Nonsteroidal antiinflammatory drugs (NSAIDs) like ibuprofen and corticosteroids can help reduce inflammation and relieve associated pain and discomfort **AntiInflammatory Medications:** Nonsteroidal antiinflammatory drugs (NSAIDs) like ibuprofen and corticosteroids can help reduce inflammation and relieve associated pain and discomfort **Lifestyle Changes:** A healthy lifestyle that includes regular exercise, a balanced diet, and stress management can help reduce chronic inflammation **Lifestyle Changes:** A healthy lifestyle that includes regular exercise, a balanced diet, and stress management can help reduce chronic inflammation **Lifestyle Changes:** A healthy lifestyle that includes regular exercise, a balanced diet, and stress management can help reduce chronic inflammation **Immunosuppressive Drugs:** For autoimmune diseases, medications that suppress the immune system's activity may be prescribed to manage inflammation .

Dietary Modifications:

Certain foods, such as those rich in omega-3 fatty acids and antioxidants, can have anti-inflammatory properties. These can be incorporated into one's diet to mitigate inflammation. **Physical Therapy:** In cases of injury-related inflammation, physical therapy may aid in the recovery process. **Surgery:** In some instances, surgical interventions may be necessary to address the underlying cause of inflammation, such as the removal of infected tissue or joint replacement in the case of severe arthritis. It's essential to understand the specific cause and type of inflammation to determine the most appropriate treatment strategy, which may involve a combination of these approaches. Consulting with a healthcare professional is crucial for proper



diagnosis and management of inflammation [3,4,5].

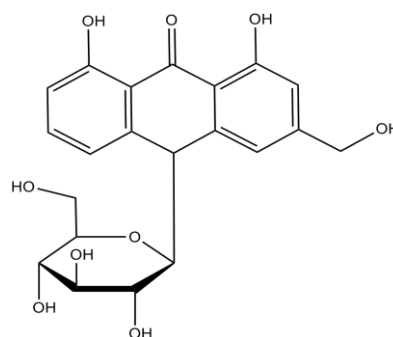


Fig no.2 : *Aloe barbadensis miller*

Aloe vera [8, 16]

Biological Name: *Aloe vera* is scientifically known as *Aloe barbadensis miller*. There are various species of Aloe, but *Aloe barbadensis miller* is the most commonly used for its medicinal and cosmetic purposes.

Synonyms: Aloe vera is often referred to by its botanical name, but it may also be known simply as "Aloe."

Scientific Classification

Table no. 01 Texonomical classification of *Aloe barbadensis Miller*

S. N.	Kingdom	Plantae
1	Sub-kingdom	Tracheobionta
2	Super-division	Spermatophyta
3	Division	Magnoliophyta
4	Class	Asparagales
5	Order	Liliopsida
6	Family	Asphodelaceae
7	Genus	Aloe
8	Species	Aloe vera

PHYTOCONSTITUENTS:

Aloe vera (*Aloe barbadensis Miller*) is a widely used medicinal plant known for its therapeutic and cosmetic benefits. Its gel contains a variety of bioactive phytoconstituents, including polysaccharides like acemannan, anthraquinones such as aloin and emodin, vitamins A, C, E, and B12, minerals like zinc and magnesium, enzymes including bradykinase, and saponins and sterols. These compounds contribute to its remarkable

anti-inflammatory, wound-healing, antimicrobial, and moisturizing properties. Aloe vera helps reduce skin irritation, promotes tissue regeneration, and enhances skin hydration, making it a popular ingredient in topical formulations such as creams and gels. Due to its natural origin and multi-targeted action, Aloe vera-based products are considered safe, effective, and beneficial for managing inflammatory skin conditions and maintaining overall skin health.

PHARMACOLOGICAL USES

Aloe barbadensis Miller (Aloe vera) is widely used in topical cream formulations due to its anti-inflammatory and healing properties, which are mainly attributed to bioactive compounds like polysaccharides, vitamins, and salicylic acid. The cream is generally prepared as an oil-in-water emulsion using ingredients such as stearic acid, cetyl alcohol, beeswax, liquid paraffin, glycerin, and water. During formulation, the oil and aqueous phases are heated separately, mixed with continuous stirring, and Aloe vera gel is incorporated, followed by cooling and pH adjustment to ensure skin compatibility. The prepared cream is evaluated for parameters like appearance, homogeneity, pH, viscosity, spreadability, irritancy, and stability. Pharmacologically, Aloe vera cream exhibits significant anti-inflammatory activity by reducing redness, swelling, and pain, while also promoting

wound healing and providing antimicrobial protection. It is commonly used in the treatment of burns, sunburn, wounds, acne, eczema, and other skin conditions.

ACTIVE CONSTITUENTS:

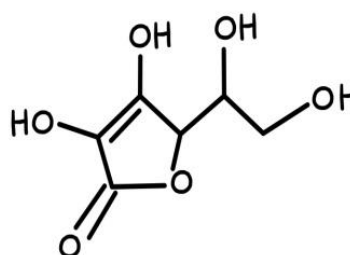
Aloe vera contains a variety of bioactive compounds, including polysaccharides, acemannan, aloin, anthraquinones, vitamins (such as A, C, and E), minerals, enzymes, and amino acids. These compounds contribute to its potential medicinal properties.

Medicinal Uses: *Aloe vera* has a long history of use for various health and skincare purposes, including:

Skin care: *Aloe vera* is known for its soothing and moisturizing properties, often used to treat burns, sunburn, skin irritations, and as a component in cosmetic products.



Fig no.3 : *Phyllanthus emblica*



Alma Plant [5, 13]

Biological Name ; *Phyllanthus emblica*

(also commonly called Indian gooseberry)

Synonyms : Emblica officinalis Emblica myrobalan Indian gooseberry

Scientific Classification :

Table no. 02 Taxonomical classification of *Phyllanthus emblica*

S. N.	Kingdom	Plantae
1	Sub-kingdom	Tracheobionta
2	Super-division	Spermatophyta
3	Division	Magnoliophyta
4	Class	Magnoliopsida
5	Order	Malpighiales

6	Family	Phyllanthaceae
7	Genus	phyllanthus
8	Species	Phyllanthusemblica

PHYTOCONSTITUENTS :

Phyllanthus emblica (Amla) contains various important phytoconstituents such as vitamin C (ascorbic acid), tannins, flavonoids, gallic acid, and Ellagic acid, which are responsible for its medicinal properties. These bioactive compounds exhibit strong anti-inflammatory, antioxidant, and antimicrobial activities. In cream formulation, Amla extract is incorporated into an oil-in-water base to enhance its topical effectiveness. The phytoconstituents help in reducing inflammation, protecting the skin from oxidative damage, and promoting faster wound healing. Due to these properties, Amla-based formulations are widely used in the treatment of acne, burns, wounds, and other skin disorders

PHARMACOLOGICAL USES :

A polyherbal anti-inflammatory cream formulated using *Phyllanthus emblica* (Amla) is widely used for its therapeutic and skin-protective properties. Amla is rich in vitamin C, tannins, flavonoids, and phenolic compounds, which contribute to its strong anti-inflammatory, antioxidant, and antimicrobial activities. The cream is generally prepared as an oil-in-water emulsion using base ingredients such as stearic acid, cetyl alcohol, beeswax, liquid paraffin, glycerin, and water, along with suitable preservatives. The formulation process involves heating the oil and aqueous phases separately, mixing them with continuous stirring, and incorporating Amla extract before cooling, followed by pH adjustment for skin compatibility. The prepared cream is evaluated for parameters like appearance, homogeneity, pH, viscosity, spreadability, washability, irritancy, and

stability. Pharmacologically, Amla-based cream helps reduce inflammation, redness, and swelling, promotes wound healing, and protects the skin from

Active Constituents :

- The major phytochemicals responsible for medicinal activity include:
- Vitamin C (Ascorbic acid)
- Tannins (Emblicanin A and Emblicanin B) Gallic acid
- Ellagic acid Flavonoids Polyphenols

Pectin : Minerals (iron, calcium, phosphorus)

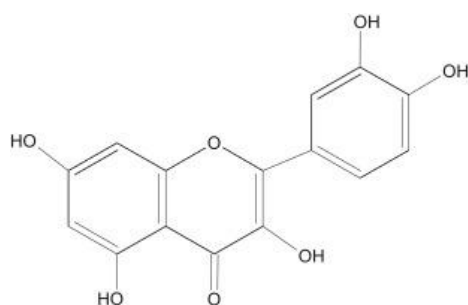
These compounds give Alma strong antioxidant and anti-inflammatory properties, which makes it useful in polyherbal creams for skin inflammation.

Medicinal Uses : Alma is widely used in traditional systems such as Ayurveda.

Major uses include:

1. Anti-inflammatory – reduces swelling and irritation of skin.
2. Antioxidant – protects cells from oxidative damage.
3. Wound healing – promotes faster healing of cuts and wounds.
4. Skin health – improves skin tone and reduces aging effects.
5. Antimicrobial – helps prevent infections.
7. Immunity booster – strengthens the immune system.



Fig no.4 *Trigonella foenum-graecum*

Plant name: Fenugreek [7, 14]

Biological name: *Trigonella foenum-graecum*

Synonyms: Methi, Greek hay Bird's food fenugreek seed

Scientific Classification

Table no. 03 Toxanomic classification of *Trigonella Foenum- Graecum*

S.N.	Kingdom	Plantae
1	Sub-kingdom	Tracheobionta
2	Super-division	Spermatophyta
3	Division	Magnoliophyta
4	Class	Magnoliopsida
5	Order	Fabales
6	Family	Fabaceae
7	Genus	Trigonella
8	Species	Trigonella Foenum-Graecum

PHYTOCONSTITUENTS

Trigonella foenum-graecum (Fenugreek) contains important phytoconstituents such as trigonelline, flavonoids, saponins, tannins, and mucilage, which contribute to its medicinal properties. These bioactive compounds provide strong anti-inflammatory, antioxidant, and antimicrobial effects, making fenugreek effective for skin care. In topical formulations, fenugreek extract is incorporated into an oil-in-water cream base to enhance its application and absorption. The phytoconstituents help reduce inflammation, soothe irritated skin, promote wound healing, and protect against microbial infections. Due to these therapeutic benefits, fenugreek-based creams are

commonly used in the treatment of acne, burns, wounds, and eczema.

PHARMACOLOGICAL USES

A polyherbal anti-inflammatory cream formulated with *Trigonella foenum-graecum* (Fenugreek) has several pharmacological uses due to its rich content of bioactive compounds such as trigonelline, flavonoids, saponins, tannins, and mucilage. These constituents provide anti-inflammatory, antioxidant, and antimicrobial effects, making the cream effective in reducing skin inflammation, redness, and swelling. Fenugreek cream also promotes wound healing by accelerating tissue repair and soothing irritated



skin. Additionally, it helps protect against microbial infections and oxidative stress, supporting skin regeneration and health. Due to these properties, fenugreek-based topical formulations are commonly used in the management of acne, burns, wounds, eczema, and other inflammatory skin conditions.

Active constituents: Alkaloids (trigonelline), saponins (diosgenin), flavonoids, tannins, mucilage.

Medicinal use: Anti-inflammatory, antioxidant, wound healing, and skin-soothing effects; used in herbal creams to reduce inflammation and irritation

CONCLUSION

The present study was carried out to develop a polyherbal anti-inflammatory formulation using *Aloe barbadensis* Miller, *Phyllanthus emblica*, and *Trigonella foenum-graecum*. These selected medicinal plants are well known for their anti-inflammatory, antioxidant, antimicrobial, and skin-protective properties. The raw plant materials were properly collected, cleaned, dried, and processed before extraction. Extraction of active phytoconstituents was successfully performed using suitable extraction techniques and solvents. The obtained extracts showed good physical characteristics such as acceptable color, odor, and consistency. The extracts were found to be suitable for incorporation into topical formulations like creams or gels. Due to limited time and resources, the study was completed only up to the extraction stage. The formulation of the polyherbal cream could not be carried out in this study. Evaluation parameters such as pH, viscosity, spreadability, stability, and anti-inflammatory activity were not performed. Overall, the study indicates that these herbal extracts have strong potential for future

development of an effective and safe polyherbal anti-inflammatory cream, and further work is recommended.

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