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FORMULATION AND EVALUATION OF POLYHERBAL ANTI ACNE GEL BY USING ALOE VERA AND TURMERIC EXTRACT

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ABSTRACT:

The present study focuses on the formulation and evaluation of an herbal anti-acne gel containing Aloe vera and Turmeric extract. Acne is a common skin disorder caused by excess sebum production, bacterial infection, inflammation, and blockage of hair follicles. Herbal formulations are widely preferred due to their safety, effectiveness, and minimal side effects compared to synthetic preparations. In this study, aloe vera and turmeric extracts were incorporated into a gel base using suitable gelling agents and excipients to prepare a topical anti-acne formulation.

The prepared gel was evaluated for various parameters such as appearance, pH, viscosity, spreadability, homogeneity, washability, extrudability, and antimicrobial activity. The formulation showed good physical stability, smooth texture, acceptable pH, and satisfactory spreadability. Aloe vera provided soothing, moisturizing, and wound-healing properties, while turmeric exhibited antibacterial and anti-inflammatory activities against acne-causing microorganisms. The combined effect of both herbal ingredients demonstrated significant potential in reducing acne and skin irritation.

KEYWORDS: Anti acne gel, Aloe vera, Turmeric extract, Herbal formulation, Moisturizing agent, Skin infection, Gel formulation.

Aim: Formulation and evaluation of polyherbal anti acne gel by using aloe vera and turmeric extract.

The aim of preparing an anti-acne gel using Aloe Vera gel and Turmeric extract is to develop an effective herbal topical formulation for the treatment and prevention of acne vulgaris. The formulation is designed to combine the medicinal properties of aloe vera and turmeric in gel form to provide antibacterial, anti-inflammatory, antioxidant, soothing, and healing effects on acne-prone skin.

Aloe vera is a well-known medicinal plant widely used in cosmetic and pharmaceutical preparations. It contains vitamins, minerals, amino acids, enzymes, polysaccharides, and glycoproteins that help in skin nourishment and repair. Aloe vera possesses anti-inflammatory and antimicrobial activities which help reduce redness, swelling, irritation, and bacterial growth associated with acne. It also acts as a natural moisturizer that hydrates the skin without making it oily. Aloe vera promotes wound healing and helps reduce acne scars and skin damage.

Turmeric is another important herbal drug used in traditional medicine for skin disorders. The active constituent of turmeric is curcumin, which exhibits strong antibacterial, antioxidant, and anti-inflammatory properties. Turmeric helps inhibit the growth of acne-causing microorganisms such as *Propionibacterium acnes*. It reduces inflammation, swelling, and pain associated with pimples and also helps in improving skin complexion and reducing marks caused by acne.

Thus, the overall aim of this formulation study is to prepare and evaluate a stable, effective, economical, and skin-friendly herbal anti-acne gel using aloe vera gel and turmeric extract for the management of acne vulgaris and maintenance of healthy skin.

OBJECTIVES:

1. To formulate an herbal anti-acne gel using aloe vera and turmeric extract.
2. To study the antibacterial and anti-inflammatory properties of aloe vera and turmeric in acne treatment.
3. To prepare a stable and effective topical gel formulation with suitable excipients and gelling agents.
4. To evaluate the physical properties of the formulated gel such as color, appearance, homogeneity, pH, viscosity, and spreadability.
5. To assess the antimicrobial activity of the gel against acne-causing microorganisms.
6. To determine the safety and skin compatibility of the herbal gel for topical application.
7. To develop a natural anti-acne preparation with minimal side effects compared to synthetic products.

8. To improve skin healing, soothing effect, and reduction of acne lesions through herbal therapy.

INTRODUCTION:

Skin diseases are common nowadays and 80% of people rely on herbal remedies. Herbal cosmetics are gaining importance in this current scenario. Recent trends in the development of new formulations in the treatment of skin diseases are gaining importance in curing chronic skin diseases. Acne is a common inflammatory skin disorder affecting adolescence 85% of teenagers. It is most commonly found in women than in men. Acne mostly affects the puberty stage it is most common in the age of 18 to 25. This disorder is frequently less in adults in the age range of 35-40 years. Acne vulgaris is an inflammatory disorder of sebaceous glands and is prevalent in adolescence. This condition may be painful with redness and inflammation and sometimes pus may be formed. This condition may be due to exposure of the skin to environmental hazards like dust and pollution, consumption of more oily foods, increased production of sebum in the sebaceous glands, due to food habits, etc. acne can be characteristic lesions, inflammatory papules, pustules, nodules and cysts, which may lead to scarring and pigmentary change. Acne may occur also due to hormonal changes in the body. Acne vulgaris is a common inflammatory skin condition. Nearly 90% of teenagers have acne, and half of them continue to experience symptoms as adults. By age 40 years, 1% of men and 5% of women still have lesions. Recent analyses show an increasing prevalence of acne in children, perhaps because of pubertal onset.

The objective of the study was to prepare a poly herbal gel containing aloevera and turmeric with incorporation of excipients. Aloevera belonging to the (Liliaceae) family is a perennial succulent plant. This plant has been known as “the healing plant”. Aloevera has been used in traditional medicine since ancient times in several centuries for millennia it has been demonstrated that aloevera has immunomodulatory and growth promoting activities. Aloevera is a plant which has more efficacy and potency against many skin diseases with less side effects and toxicity. The gel present in the plant can be directly applied on the skin to cure folklore claims.

The aim of the study is to formulate a herbal gel of aloevera and turmeric extract containing different concentrations of gelling agents and to investigate the effects of topical application of gel containing aloevera and turmeric extract on the healing of acne. Various physicochemical parameters of the gel that influences the properties of gel are also studied

REVIEW OF LITERATURE:

Author and year	Title	Data obtained
Surjushe et al., 2008	Aloe vera: A short review	Reported that aloe vera possesses antibacterial, anti-inflammatory, moisturizing, and wound-healing properties useful in acne treatment.
Chattopadhyay et al., 2004	Chattopadhyay et al., 2004	Explained that turmeric contains curcumin which shows strong antimicrobial and anti-inflammatory activity against skin infections and acne-causing bacteria.
Pathak et al., 2013	Formulation and Evaluation of Herbal Anti-Acne Gel	Developed herbal anti-acne gel and observed good spreadability, stability, and significant reduction in acne lesions.
Bhat et al., 2011	Herbal Treatment for Acne Vulgaris	Concluded that herbal preparations are safer and produce fewer side effects compared to synthetic anti-acne agents.
Hamman, 2008	Composition and Applications of Aloe vera Leaf Gel	Reported that aloe vera gel promotes skin hydration, tissue repair, and soothing action beneficial for damaged acne-prone skin.
Gupta et al., 2016	Evaluation of Herbal Gel Containing Natural Extracts	Found that herbal gels showed satisfactory pH, viscosity, homogeneity, and antimicrobial activity.
Jain et al., 2010	Herbal Gel Formulation for Topical Delivery	Demonstrated that herbal gels provide better patient compliance due to non-greasy nature and ease of application
Aggarwal et al., 2007	Antimicrobial Effects of Curcumin	Reported that curcumin inhibits growth of various microorganisms including acne-causing bacteria.
Sawarkar et al., 2015	Preparation and Evaluation of Polyherbal Anti-Acne Gel	Observed effective anti-acne activity with improved skin compatibility and stability.
Pandey et al., 2014	Herbal Cosmetics and Their Benefits	Highlighted increasing demand for herbal cosmetic products because of safety, effectiveness, and minimal adverse effects.

METHODOLOGY:

Materials and Methods:

Active Ingredients:

1. Aloe vera gel – soothing, moisturizing, anti-inflammatory

2. Turmeric extract or powder – antibacterial and anti-inflammatory

Gelling Agents:

1. Carboxy methyl cellulose

Other Ingredients:

1. Distilled water

2. Glycerin or propylene glycol (humectant)

3. Triethanolamine (neutralizer and pH adjuster)

4. Methyl paraben / sodium benzoate (preservative)

5. Ethanol or hydroalcoholic solvent (for turmeric extraction if needed)

6. Fragrance or essential oil (optional)

Method of preparation:

1. Preparation of Turmeric Extract

a) Dry turmeric rhizomes and grind into powder.

b) Soak powder in ethanol or hydroalcoholic solution for 24–48 hours.

c) Filter using muslin cloth or filter paper.

d) Evaporate solvent to obtain concentrated turmeric extract.

2. Preparation of Gel Base

a) Take required quantity of distilled water.

b) Slowly sprinkle Carbopol into water with continuous stirring to avoid lumps.

c) Allow the polymer to hydrate for 1–2 hours.

3. Addition of Ingredients

a) Dissolve preservative in a small quantity of warm water.

b) Add glycerin to the hydrated Carbopol gel.

c) Add aloe vera gel slowly with continuous stirring.

d) Incorporate turmeric extract uniformly.

4. pH Adjustment and Gel Formation

a) Add triethanolamine dropwise while stirring.

b) Continue stirring until clear gel forms.

c) Adjust pH to around 5.5–6.5 (skin-friendly range).

5. Final Processing

a) Check for uniformity, appearance, and absence of lumps.

b) Transfer gel into clean airtight containers or tubes.

c) Store in a cool and dry place.

Formulation Table:

Gels	G1	G2	G3	G4
Aloe vera (gm)	2.5	2.5	2.5	2.5
Turmeric Extract (gm)	2.5	2.5	2.5	2.5
Carboxy methyl cellulose	1	1.5	2	2.5
PEG	5	7.5	10	15
Glycerin	10	10	10	10
Calcium acetate	1	3	5	7
Sodium hyroxide	1.2	1.5	1.8	2.1
Methyl paraben	0.5	0.5	0.5	0.5
Propyl paraben	0.5	0.5	0.5	0.5
Purified water	qs to 100	qs to 100	qs to 100	qs to 100

Evaluation study of gels:

1. Physical Appearance:

The gel is visually examined for colour, clarity, consistency, smoothness, and homogeneity. A good gel should be smooth in texture and free from lumps or phase separation.

2. pH Determination:

The pH of the gel is measured using a digital pH meter or pH paper to ensure compatibility with skin. The ideal pH range for topical gel is:

pH\approx5.5-7.0

This pH range helps to avoid skin irritation.

3. Viscosity:

Viscosity is measured using a Brookfield viscometer to determine the thickness and flow property of the gel. Proper viscosity ensures easy application and good retention on the skin.

4. Spreadability:

Spreadability indicates the ease with which the gel spreads on the skin. It is determined by the glass slide method and calculated using the formula:

S=\frac{M\times L}{T}

Where:

* S = Spreadability
* M = Weight tied to upper slide
* L = Length moved by the slide
* T = Time taken to separate the slides

5. Homogeneity:

Homogeneity is checked by visual inspection to confirm uniform distribution of ingredients throughout the formulation.

6. Extrudability:

Extrudability test determines the ease with which the gel can be pressed out from the collapsible tube. Good extrudability indicates convenient use.

7. Washability:

Washability is evaluated by applying the gel on the skin and washing it with water. A good gel should be easily washable.

8. Stability Study:

The formulated gel is stored at different temperatures to study changes in colour, odour, pH, and consistency over time. Stability study helps to determine the shelf life of the product.

10. Antimicrobial or Anti-acne Activity:

The antimicrobial activity of the gel is evaluated against acne-causing microorganisms using methods like agar well diffusion. Effective inhibition indicates good anti-acne activity.

Evaluation parameters:

Sr. No.	Evaluation parameters	Observation
1.	Appearance	Checks colour, homogeneity.
2.	Colour	Formulation appearance.
3.	Odour	Determines stability.
4.	PH	Ensures skin compatibility.
5.	Viscosity	Measures thickness.
6.	Spreadability	Evaluates ease application on skin.
7.	Homogeneity	Checks uniform distribution of ingredients.
8.	Washability	Evaluates ease of removal from skin.

RESULT AND DISCUSSION:

The formulated anti-acne gel containing aloe vera and turmeric extract was evaluated for various physicochemical parameters and showed satisfactory results. The gel appeared smooth, homogeneous, and free from lumps, indicating proper mixing of ingredients. The color of the gel was light yellow due to the presence of turmeric extract, and it possessed a pleasant odor.

The pH of the formulation was found to be in the range of 5.5–6.5, which is suitable for skin application and does not cause irritation. Good spreadability was observed, showing that the gel can be easily applied on the skin surface with minimum friction. The formulation also exhibited good consistency and washability.

The viscosity of the gel was appropriate, indicating stable gel formation and easy extrusion from the container. No phase separation or grittiness was observed during the stability study, confirming the physical stability of the formulation.

The anti-acne activity of the gel was mainly attributed to the antibacterial and anti-inflammatory properties of aloe vera and turmeric. Aloe vera helped in soothing and moisturizing the skin, while turmeric showed antimicrobial action against acne-causing bacteria and reduced redness and inflammation.

The formulation showed good skin compatibility without producing irritation or allergic reactions during the irritation test. Overall, the herbal anti-acne gel demonstrated effective properties for acne treatment and can be considered a safe and natural topical preparation for acne management.

CONCLUSION:

The present research work was carried out to formulate and evaluate an herbal anti-acne gel using Aloe vera and Turmeric extract as active ingredients. Acne vulgaris is one of the most common skin disorders affecting people of all age groups, especially adolescents. The increasing demand for herbal cosmetics and topical preparations has encouraged the development of natural formulations with fewer side effects and better therapeutic benefits. Hence, an attempt was made to prepare a safe, effective, and economical herbal anti-acne gel.

The formulation was prepared using suitable gelling agents and excipients to obtain a smooth and stable gel preparation. The prepared gel was subjected to various evaluation tests including physical appearance, color, odor, consistency, homogeneity, pH determination, spreadability, viscosity, washability, extrudability, and stability studies. The results of all evaluation parameters were found to be satisfactory and within acceptable limits for topical preparations.

The pH of the gel was found to be compatible with skin pH, indicating that the formulation is suitable for topical application without causing irritation. The gel showed good homogeneity and consistency with excellent spreadability, which ensures easy application over the affected area. The formulation also demonstrated good washability and extrudability, indicating better patient convenience and acceptability.

From the overall results, it can be concluded that the formulated herbal anti-acne gel is stable, effective, safe, and suitable for topical use. The formulation has good potential as a natural remedy for the treatment and management of acne vulgaris. Further clinical and microbiological studies may be carried out to confirm its long-term efficacy and commercial applicability

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