WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 6, 482-492. Review Article ISSN 2277–7105

POLYHERBAL TOPICAL GEL FOR THE TREATMENT OF ACNE

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Article Received on
27 Jan. 2025,

Revised on 16 Feb. 2025,
Accepted on 08 March 2025

DOI: 10.20959/wjpr20256-35886

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ABSTRACT

The skin is the most vulnerable element of the body. Acne, pimples, pigmentation, and sunburn markings are common skin issues caused by daily exposure. Acne is the most frequent skin disorder nowadays. Acne vulgaris is a follicular skin condition that affects the Pilosebaceous unit of the face, neck, and trunk. It causes inflammatory (papules, pustules, nodules, and cysts), non- inflammatory (seborrhoea and comedones), and scarring. Acne is primarily caused by Propionibacterium acnes (P. acnes), which causes inflammation by releasing extracellular enzymes such as proteases, hyaluronidase, and lipases. Acne, black spots, and other skin problems affect 90-95% of the pubertal population, 25-45% of adults, and less than 25% of women. Women above the age of 25 can still experience adult female acne. Acne vulgaris has traditionally been treated with topical and systematic therapy containing synthetic chemicals. Herbal medicines offer a safer and more effective alternative to synthetic pharmaceuticals for treating acne vulgaris. Natural remedies for acne vulgaris have gained popularity due to their efficiency in treating the disfiguring condition.

KEYWORDS: Acne vulgaris, Propionibacterium acnes, Herbs, Antibacterial, Anti-inflammatory.

INTRODUCTION

The skin is the most vulnerable element of the body. Daily skin exposure can cause acne, pimples, pigmentation, and sunburn marking. Acne is the most frequent skin disorder nowadays. During puberty and adolescence, individuals with this skin disease experience low self-esteem regarding their physical appearance. Acne vulgaris is a chronic inflammatory condition that affects the pilosebaceous unit, which includes hair follicles and sebaceous glands on the skin. Acne is divided

into non-inflammatory lesions (whiteheads, blackheads) and inflammatory lesions (papules, nobles, pustules, podules, cysts).

One of the most important short-season, summer-growing legumes is Vigna radiata. Flavonoids, phenolic acids, and organic acids are among the many chemical components that are well known for their anti-inflammatory, antibacterial, and antioxidant qualities.

A vital component in cosmetics is aloe barbadensis. When creating different topical treatments for skin diseases like burns, wounds, acne, rashes, psoriasis, cold sores, or dry skin, aloe gel is the recommended ingredient. Additionally, burns, pigmentation, acne, and other skin conditions are treated with it as an emollient and carrier.

This study's primary goal was to create a gel-like topical dosage of the previously stated herbal ingredients that was both effective and safe. The physical properties of the produced formulations were evaluated.

Causes of acne vulgaris

Acne symptoms vary according on the severity of your issue.

- Whiteheads (closed, clogged pores)
- Blackheads (open, clogged pores)
- Small red and painful lumps (papules)
- Pimples (pustules) are papules containing pus at the tips.
- Large, firm, painful lumps beneath the skin (nodules)
- Cystic lesions are painful, pus-filled tumours underneath the skin.

There are four primary causes of acne: Excess production of oil (sebum) Blockages in hair follicles caused by dead skin cells and oil Inflammation from Bacteria.

- Because the face, forehead, chest, upper back, and shoulders contain the most oil (sebaceous) glands, acne usually develops there.
- Oil glands are linked to hair follicles.
- A whitehead may form from a bulging follicular wall. Alternatively, a blackhead could form if the plug is exposed to the surface and darkens.
- Blackheads might resemble dirt trapped in pores. However, the pore is actually clogged with oil and bacteria, which turns brown when exposed to air.

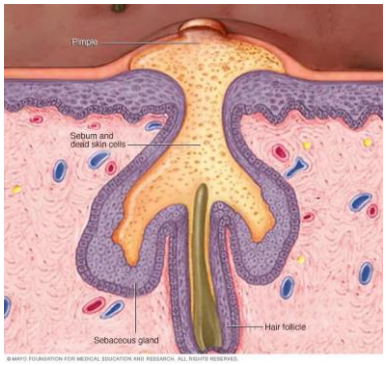

Fig. 1.

How acne develops - When dead skin cells and sebum, an oily material that lubricates your skin and hair, clog hair follicles, acne results. Bacteria can cause infection and inflammation, which exacerbates acne.

Acne can be aggravated or caused by certain things.

- Hormonal Changes: During puberty, both boys and girls produce more androgens, which drive the sebaceous glands to swell and produce more sebum. Midlife hormonal changes, especially in women, can also cause breakouts.
- Certain Medications: Examples include medications that contain lithium, testosterone, or corticosteroids.
- Eat a Diet: According to studies, eating certain foods, such as foods high in carbohydrates like bread, bagels, and chips, may make acne worse. Whether adhering to particular dietary restrictions would help patients with acne requires more research.
- Stress: Although stress doesn't cause acne, it can exacerbate pre-existing acne.

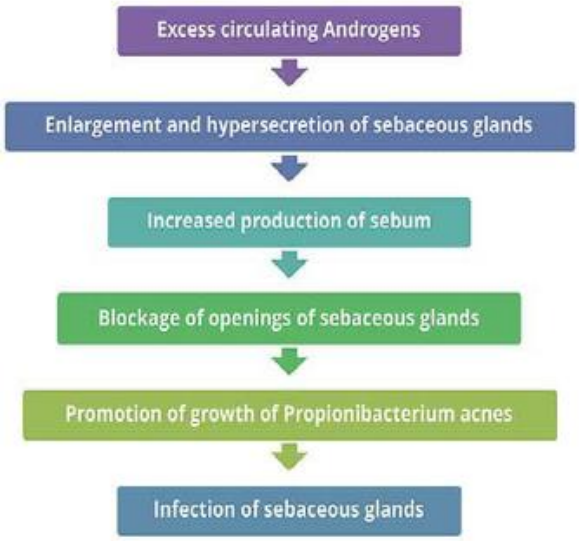

Fig. 3 Cystic acne.

The most severe type of acne, cystic acne, is brought on by an accumulation of dead skin cells and oil deep within hair follicles. Your skin may rupture as a result, causing inflammation that resembles boils.

Traditional approaches to treat acne vulgaris

Topical therapies include benzoyl peroxide, salicylic acid, and retinoic acid. They are typically the initial line of treatment for mild acne. Systemic treatments include antibiotics, retinoids, and hormonal therapies. Phototherapy is commonly used in conjunction with topical and systemic therapies for moderate to severe acne. Chemical peeling is another conventional acne therapy. Herbs are a popular alternative for treating acne since they are simple to use and have fewer side effects than other treatments. Tea tree oil can help reduce inflammation, bacteria, and oxidative stress, which can all contribute to acne. It can be used in skincare products or as a spot treatment. Lifestyle adjustments include using a gentle cleanser on your face, avoiding allergens, and protecting your skin from the sun. You should also refrain from touching or picking acne- prone regions. Other factors to consider include managing stress levels. Avoiding high-glycemic index foods and dairy-based goods. Managing underlying health issues, such polycystic ovarian syndrome.

Herbal remedies for acne

Numerous natural remedies and plants, such as neem, aloe vera, turmeric, tea tree oil, and green tea, are frequently used to treat acne vulgaris. The effectiveness of each herbal remedy is also contrasted with that of traditional treatments including topical retinoids, benzoyl peroxide, and antibiotics. The review article also covered the drawbacks of traditional treatments, including the

emergence of antibiotic resistance and adverse skin conditions including dryness and inflammation. For the treatment of acne vulgaris, the authors proposed that herbal medicines might be a safer option than traditional therapies.The authors of the study collected 22 distinct plant species from different parts of India and used organic solvents to extract the active chemicals from them. The agar well diffusion method was then used to test the extracted chemicals against a variety of microorganisms, such as bacteria and fungi. The study's findings demonstrated the strong antibacterial activity of a number of the plant species. Extracts from Terminalia chebula, Terminalia belerica, and Emblica officinalis, for instance, demonstrated strong efficacy against a variety of bacteria and fungus, including some strains that are resistant to antibiotics.

Some of the herbs screened in the study and their properties are.

Azadirachta indica (Neem)	antimicrobial activity against a variety of bacteria and fungi
Allium sativum (Garlic)	Garlic showed antimicrobial activity against both Gram-positive and Gram-negative bacteria.
Curcuma longa (Turmeric)	antimicrobial activity against several bacterial and fungal strains.
Ocimum sanctum (Holy basil)	antimicrobial activity against several bacterial and fungal strains
Emblica officinalis (Amla)	antimicrobial activity against several bacterial strains

Other herbs used against acne.

1. Tea tree oil:.antifungal, antibacterial, and anti-inflammatory
2. Neem: antibiotic, antifungal, and anti-inflammatory
3. Turmeric: antimicrobial, anti-inflammatory, and antioxidant
4. Licorice root: antibacterial and anti-inflammatory
5. Aloe vera: demonstrates antibacterial and anti-inflammatory properties
6. Chamomile: Antioxidant and anti-inflammatory
7. Witch hazel: exhibits anti-inflammatory and astringent properties.
8. Green tea: Antioxidant and anti-inflammatory.

Some botanicals used in treatment of acne.

1. Echinacea (Echinavea purpurea): Echinacea can strengthen the immune system and contains antibacterial qualities.
2. Calendula (Calendula officinalis): Calendula possesses antibacterial and anti-inflammatory qualities.
3. Licorice (Glycyrrhiza glabra): There are substances in liquorice that have anti-inflammatory

qualities.

Formulation and Evaluation of Polyherbal Topical Gel

The seeds of Vigna radiata were purchased from a nearby market and verified by the Department of Botanical Survey, TNAU, Coimbatore, while Aloe barbadensis was gathered from the medicinal garden of Shri Sai Institute of Pharmacy.

Vigna radiata seeds were gathered and ground into tiny pieces. Ethanol was used as a solvent in the Soxhlation procedure to extract roughly 500 g of the crushed Vigna radiata powder. The procedure went on until the solvent was found to be clear. A desiccator was used to evaporate the extract until it was completely dry.

Aloe barbadensis fresh leaves were gathered. Using a mortar and pestle, the inner gel-like pulp in the middle of the leaf was separated, minced, and homo genised after the outer thick skin was carefully removed. To get a clear liquid, it was filtered through a muslin cloth Carbopol 940, the gelling agent, was dissolved in a sufficient amount of water at different concentrations. Additionally, propylene glycol—a plasticiser or humectant—was added.

Methylparaben and propylparaben, the preservatives, were moved and mixed. Triethanolamine was added to bring the pH down to neutral, and distilled water was used to get the gel's ultimate weight up to 50 g.

The aforementioned mixture was left at room temperature for 24 hours to assess its stability and consistency after being agitated for 2 hours at 500 rpm to eliminate any air bubbles.

The ethanolic extract of Vigna radiata at different concentrations and 5 mL of Aloe barbadensis liquid were added to the optimised Carbopol gel using the recipe listed in formulation of POLYHERBAL GEL. After two hours of stirring at 500 rpm, the entire mass was left undisturbed at room temperature for a day.

Physical characteristics of the polyherbal gel formulation, including colour, appearance, pH, viscosity, and spreadability, were examined.

After the gel was placed in the container, its homogeneity, viscosity, and organoleptic properties were examined, and the presence and appearance of any aggregates were confirmed.

- **Formulation of Carbopol gel.**

Ingredients	G1	G2	G3
Carbopol 940	1%	1.5%	2%
Propylene glycol	5 mL	5 mL	5 mL
Methyl paraben	0.15 g	0.15 g	0.15 g
Propyl paraben	0.30 g	0.30 g	0.30 g
Triethanolamine	5 mL	5 mL	5 mL
Water	q. s	q. s	q. s

- **Formulation of polyherbal gel.**

Ingredients	F1	F2	F3
Vigna radiata extract	1%	1.5%	2%
Aloe barbadensis gel	5 mL	5 mL	5 mL
Carbopol 940	2%	2%	2%
Propylene glycol	5 mL	5 mL	5 mL
Methyl paraben	0.15 g	0.15 g	0.15 g
Propyl paraben	0.30 g	0.30 g	0.30 g
Triethanolamine	5 mL	5 mL	5 mL
Water	q. s	q. s	q. s

- **Physical appearance of the formulated gel.**

Characteristics	F1	F2	F3
Physical appearance	Transparent gel	Transparent gel	Transparent gel
Color	Pale yellow	Pale yellow	Pale yellow
Homogeneity	Absence of aggregates	Absence of aggregates	Slight aggregates

An illustration of a polyherbal gel that contains Aloe barbadensis and Vigna radiat.

- **Measurement of pH, viscosity, and spreadability.**

Formulation Code	pH	Viscosity (cps)	Spreadability (g cm/s)
F1	5.9	1428 ± 0.1	19.37
F2	5.7	1425 ± 0.8	21.35
F3	5.8	1358 ± 0.3	22.13

- **Test data of gel strength.**

Gel Strength/ m Value (g) Force 1	Force at Target (cycle:1) (kg)	Radiant to Positive Peak (cycle:1) kg/s
0.693	0.016	0.004

- **Test data of extrudability.**

Firmness (g)	Force at Target (Cycle:1) (kg)	Force at 5 mm (Cycle:1) (kg)
3168.854	3.369	3.228

Characterization.

The antibacterial, physicochemical, and acne-treatment efficacy of polyherbal gels are their defining characteristics:

antimicrobial qualities Acne-causing microorganisms like Candida albicans, Escherichia coli, and Staphylococcus aureus can be effectively combatted by polyherbal gels. Using agar well diffusion, the gel's antibacterial efficacy can be assessed.

Physical-chemical characteristics The gel's colour, look, consistency, pH, spreadability, and washability can all be assessed.Effectiveness of acne treatment Gels made of polyherbal ingredients may be useful in treating mild to moderate acne.One study, it is discovered that polyherbal gel just effective as treating mild acne as clindamycin gel.

CONCLUSION

Because the great majority of plants are harmless and have few to no adverse effects, they are considered a substantial source of potentially beneficial substances for the development of novel therapeutic therapies. (s). Topical application of gels at pathological sites provides significant benefits over cream and ointment in terms of a quicker release of a medication straight to the site of action. This investigation made it abundantly evident that each herbal ingredient has unique chemical components and has antibacterial activity.

ACKNOWLEDGMENT: I want to express my gratitude to everyone who has assisted me, whether directly or indirectly, in finishing this project successfully. The process would be easier if I thanked each of them separately, but I must give special thanks to a few of the characters.There aren't enough words to adequately convey how grateful I am to my esteemed and respected mentor, Ms. Ifra Shaikh, for her academic knowledge, sound judgement, insightful advice, creative ideas, and unwavering inspiration. She has also given me the fantastic opportunity to work on this fantastic project on the subject of "Development of Polyherbal Topical gel for the Treatment of Acne," which has taught me a lot of new things.Second, I want to express my gratitude to all of my friends for their invaluable assistance in getting this project finished on time.

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