

Evaluation and Formulation of Herbal for the Treatment of Acne

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Abstract: *The present research was carried out to formulate an herbal anti-acne cream intended for nourishing, moisturizing, and treating different skin-related conditions. The cream was developed using various crude drugs such as Manjistha, Aloe vera, Neem, Liquorice and Vitamin E oil. These ingredients were selected based on their established therapeutic properties. Manjistha helps in blood purification, reduces skin inflammation, and improves skin complexion, thereby aiding in the reduction of acne, pimples, and acne scars. Aloe vera provides deep moisturizing, soothes irritated skin, reduces redness, and promotes healing of acne lesions while preventing dryness. Neem exhibits strong antibacterial and antifungal activity, which helps in controlling acne-causing microorganisms and prevents skin infections. Liquorice possesses anti-inflammatory and skin-lightening properties that help to reduce pigmentation, dark spots, and redness associated with acne. Vitamin E oil acts as a powerful antioxidant that nourishes the skin, supports skin repair, maintains skin elasticity, and helps in minimizing acne scars, making the cream beneficial for overall skin health.*

Herbal remedies are more acceptable in the view that they are safe with fewer side effects than the synthetic ones. Herbal formulations have more demanded in the market. The present work deals with the Development and Evaluation of Novel Poly-Herbal Anti-Acne Formulation containing hydro-alcoholic extract of neem leaves, (Azadirachta indica), extract from leaves of Ocimum Sanctum (OS), Aloe vera powder & tea tree oil. Although various anti acne herbal formulations for acne are available in the market, we propose to make use of hydro-alcoholic extract of neem (Azadirachta indica) leaves, extract from leaves of Ocimum Sanctum (OS), Aloe vera powder & tea tree oil. The plants have been reported in the literature having good anti-microbial, anti-oxidant and anti-inflammatory activity. Various formulation batches i.e., F1 to F19 were prepared using different gelling agents like carbopol 934, carbopol 940 and HPMC K4M in varied concentrations. Prepared formulations (F1 to F19) were evaluated for various parameters like colour, appearance, consistency, washability, pH, spreadability along with antimicrobial efficacy study. Optimized formulation was compared with the marketed preparation. Amongst all the formulation studied batch F4 was found optimum for all the parameter.

Keywords: *Manjistha*

I. INTRODUCTION

Skin is the most exposed part of the human body. Constant day-to-day exposure of human skin to ultraviolet (UV) radiations, pollution, dust, chemicals etc leads to the number of skin disorders such as acne, pimples, hyperpigmentation and sunburn marks. Acne vulgaris (acne) is most typical follicular skin disease that principally affects the pilosebaceous follicular unit of the face, neck, and trunk. The numbers of topical and systematic therapies using synthetic ingredients are available for so long to cure acne vulgaris. Acne vulgaris (acne) is common chronic skin disorder occurring in adolescence and in young adulthood that involves various pathogenetic factors like blockage or inflammation of pilosebaceous units, abrupt increase in body androgens, epidermic hyperproliferation, blocking of sebaceous glands of skin, microbial establishment of pilosebaceous entities The over activate sebaceous glands stimulated by androgen causes proliferation of P. acnes, an anaerobe present within the retained sebum in the



pilosebaceous ducts. On skin, the characterization of acne is observed by both inflammatory (papules, pustules and nodules) and non-inflammatory (comedowns, open and closed) lesions.

Acquisition of antibiotic resistance by these microorganisms and adverse effects associated with the current treatment regimens requires the introduction of novel therapeutic agents for acne vulgaris. Clinically, acne is usually observed on the face, upper part of the chest, and the back of subjects who possess greater numbers of oil glands. Common therapies that are used for the treatment of acne include topical, systemic, hormonal, herbal and combination therapy. Consumption of herbal medicinal plants is common amongst patients affected by acne and infectious skin diseases. Herbal plants have a long history of use and have been shown to possess low side effects. Nano-technological approaches such as particulate (solid lipid nanoparticles and microspheres), vesicular (liposomes and noisome), colloidal drug delivery systems (micro-emulsion and nano-emulsion), and miscellaneous systems (aerosol foams and micro-sponges) have an important place in acne therapy. These approaches have an immense opportunity for the designing of novel, low-dose, targeted and effective treatment systems for treatment of acne vulgaris. In this review, we specially focus on the different nanotechnological approaches for an effective treatment of acne.

Acne is a dermatological condition characterized by inflammation or infection of the sebaceous (oil) glands. It affects nearly three-quarters of individuals between the ages of 11 and 30, making it one of the most prevalent skin disorders worldwide. Skin pimples typically appear as inflamed, erythematous lesions that protrude from otherwise healthy skin. Although acne may develop on various parts of the body, it most commonly affects the face. Lesions may present in different forms, with the most common being circular in shape, and their appearance may vary as red, black, or white depending on the stage and underlying cause.



Figure 1 Acne

Acne vulgaris, a chronic, inflammatory disease of the pilosebaceous follicles, is a pervasive skin disorder that presents regardless of sex, skin colour, or ethnicity. An estimated 40 to 50 million Americans suffer from the disorder, including more than 85 percent of teenagers.¹⁻³ However, while acne is typically perceived as a disease of adolescents, adult acne remains a significant problem. Studies have shown a worldwide prevalence of female adult acne to be as high as 41 percent, with adult acne being more prevalent in women than men.⁴⁻⁶ Acne is the most common reason for dermatologist visits in the United States for individuals aged 15 to 44 years.⁷ As seen in adolescent acne, adult acne (particularly among women) can have a negative impact on social, emotional, and psychological well-being.⁸⁻¹¹ For these reasons, effective treatments are important.



All of the commonly employed topical medications for acne have certain limitations to treatment: topical benzoyl peroxide can cause dryness, cutaneous irritation, and staining; oral and topical antibiotics can lead to bacterial resistance; and retinoid use can result in dryness, scaling, irritation, burning, stinging, and erythema. Thus, there is need for a new topical acne treatment with good efficacy and a strong safety profile for women with mild-to-moderate acne. Additionally, antiaging effects would likely be considered added benefits to an effective topical acne treatment product. Sodium copper chlorophyllin complex is a semisynthetic mixture of the water-soluble sodium salt of copper chlorophyllin and small molecule analogues derived from plant chlorophyll that possesses a unique combination of anti-inflammatory, antibacterial, and antioxidant activities. Sodium

1. To select suitable herbal ingredients with proven anti-acne properties. (E.g.: Manjistha, Neem, Aloe vera, Liquorice, Vitamin E oil)
2. To prepare an herbal cream formulation using appropriate excipients for topical application.
3. To evaluate the physicochemical properties of the formulated cream.
4. To perform a skin irritation test to ensure the safety of the formulation.
5. To conduct accelerated stability studies to determine the shelf life of the product.
6. Reduce excess oil production (sebum)
7. Helps prevent clogged pores that lead to pimples.
8. Prevent blockage of hair follicles
9. Removes dead skin cells and keeps pores open.
10. Control bacterial growth
11. Especially Cut bacterium acnes bacteria that contribute to inflammation.
12. Reduce inflammation and redness
13. Helps painful pimples, swelling, and irritation heal faster.
14. Prevent new acne lesions
15. Limits the formation of blackheads, whiteheads, papules, pustules, nodules, and cysts.
16. Avoid acne scars and pigmentation
17. Early and proper treatment reduces permanent marks and dark spots.
18. Improve skin appearance and texture
19. Promotes clearer, healthier-looking skin.
20. Improve psychological well-being
21. Managing acne can improve confidence, self-esteem, and social comfort.
22. Maintain long-term control
23. Prevents recurrence through skincare, lifestyle changes, and maintenance therapy.
24. Common treatments may include topical medicines, antibiotics, retinoids, hormonal therapy, and skincare measures depending

One of the main causes of acne is overproduction of sebum by sebaceous glands. Sebum is an oily substance that normally protects and moisturizes the skin. However, when too much oil is produced, it mixes with dead skin cells and blocks hair follicles. Blocked follicles create an ideal environment for acne formation. Excess oil makes the skin greasy and increases the chance of pimples, blackheads, and whiteheads.

Sebum production is strongly influenced by hormones, especially androgens, which increase during puberty. This is why acne is very common in teenagers.

The skin continuously sheds dead cells. Sometimes these dead cells do not leave the skin properly and instead accumulate inside hair follicles. When mixed with sebum, they form a plug called a comedo.

There are two main types:

Whiteheads (closed comedos): pores remain closed.

Blackheads (open comedos): pores remain open and darken due to oxidation. Blocked follicles are the starting point of most acne lesions.



A bacterium called cut bacterium acnes (formerly Propionibacterium acnes) naturally lives on the skin. In blocked follicles, this bacterium multiplies rapidly because of trapped oil and low oxygen levels.

The bacteria produce substances that irritate the skin and trigger inflammation. This leads to: Redness

Swelling Pain

Pus formation

As inflammation increases, papules, pustules, nodules, and cysts may develop.

Hormones play a major role in acne development. Increased androgen hormones enlarge sebaceous glands and stimulate oil production.

Hormonal changes occur during: Puberty Menstruation Pregnancy Menopause

Types of Skin



Human skin can be broadly categorized into different types based on its oil and moisture content, namely normal, oily, dry, and combination skin.

Dry skin

Dry skin occurs due to insufficient moisture, resulting in a rough, tight, and sometimes hardened texture. The skin often appears dull and dehydrated. People with dry skin may experience discomfort, irritation, and heightened sensitivity. Factors such as climatic conditions, genetic makeup, aging, and poor hydration levels contribute to this condition. Consistent application of moisturizers helps in replenishing moisture and maintaining the skin's protective barrier. In severe cases, extreme dryness may lead to itching or dermatitis.



Symptoms



Figure 3: Types of Acne

Papules

An acne papule is a solid, raised, and inflamed bump on the skin that does not contain a visible white or yellow pus-filled head. Measuring less than 1 centimeter in diameter, papules represent a transition from mild, non-inflammatory acne (blackheads and whiteheads) to moderate, inflammatory acne vulgaris. They are typically red, pink, or purple, and are often tender or painful to the touch.

Papules are small, red, raised bumps caused by inflammation of blocked hair follicles. They develop when the follicle wall becomes irritated or damaged.

Symptoms of papules include:

Redness Tenderness Mild pain Swelling

Papules do not contain pus. They are usually sensitive to touch and may occur in clusters.

4. Nodules

Nodules are large, hard, painful lumps that develop deep under the skin. They occur when severe inflammation affects deeper layers of the skin.

Symptoms include:

Large swollen bumps Significant pain

Deep skin involvement Long healing time

Nodules are considered a severe form of acne and often require medical treatment. They may leave permanent scars after healing

Why They Form:

Nodules develop deep inside the hair follicle structure. They form when a pore becomes completely blocked by a mixture of excessive sebum (skin oil) and dead skin cells. Normal skin bacteria—specifically *Cutibacterium acnes* (*C. acnes*)—becomes trapped in this blockage, triggering a deep-seated infection.



As the blockage expands, the follicle walls completely rupture deep within the skin. This spills bacteria, keratin, and sebum into the surrounding dermis, triggering a massive, widespread inflammatory response. Genetic predisposition, intense hormonal fluctuations (such as elevated androgens), stress, and certain medications can also trigger their formation.

The formation of an acne nodule is a multi-factorial process driven by a severe, systemic failure of the pilosebaceous unit. The step-by-step microscopic progression involves: Hyperkeratinization & Sebum Excess: Driven heavily by systemic androgenic surges, hyperseborrhea couples with abnormal desquamation of follicular epithelial cells (retention hyperkeratinization), completely occluding the follicular infundibulum.

- Microbial Proliferation & Anaerobiosis: The trapped sebum constructs an ideal hypoxic, lipid-rich environment for the exponential proliferation of *Cutibacterium acnes* (*C. acnes*).
- Follicular Wall Rupture: As microbial metabolites and sebum exert high mechanical pressure, the epithelial lining of the deeply seated follicle experiences an acute structural rupture.
- Deep Dermal Extravasation: The structural collapse forces highly irritating keratin fragments, immunogenic *C. acnes* proteins, and lipids directly into the surrounding dermis. This immediately triggers a profound innate immune cascade, marked by massive neutrophil infiltration and the upregulation of matrix metalloproteinases (MMPs like MMP-8 and MMP-9).
- Enzymatic Tissue Liquefaction: Active immune cells release extensive amounts of matrix metalloproteinases (MMPs like MMP-1, MMP-8, and MMP-9).

Any attempt to manually compress or squeeze nodulocystic lesions is strictly contraindicated. Because these lesions lack a superficial exit path (no "head"), lateral mechanical force causes the internal fibrous walls to rupture further down. This drives the highly destructive necrotic and bacterial payload deeper into adjacent healthy dermal layers and subcutaneous tissue, instantly expanding the field of inflammation and compounding tissue loss.

Systemic and Interventional Treatment Modalities

Pharmacotherapeutic / Interventional Agent	Class / Mechanism of Action	Primary Clinical Indication in Nodulocystic Acne
Oral Isotretinoin (Accutane)	Systemic Synthetic Retinoid	The absolute gold standard and definitive first-line therapy. It halts sebum production, shrinks sebaceous glands, normalizes keratinization, and shuts down the deep inflammatory cascade.
Oral Corticosteroids (e.g., Prednisone)	Systemic Glucocorticoid	Prescribed as a short-term bridging therapy alongside initial isotretinoin to rapidly suppress extreme inflammation and prevent paradoxical flaring.



Intralesional Corticosteroids (Triamcinolone Acetonide)	Targeted Interventional Anti- inflammatory	Injected directly into highly painful, isolated cysts to induce rapid lesion flattening within 24–48 hours, providing immediate pain relief and preventing tissue loss.
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Herbal Drugs Used in Formulation

Formulation and Evaluation of Anti-Acne Herbal Cream

1. Aloe-vera



Fig.4- Aloe vera

Leaves of Aloe barbadensis

Soothing, anti-inflammatory, wound healing -Aloin, Aloemodin

- Asphodelaceae (previously Liliaceae).
- Aloe.
- Aloe barbadensis (commonly known as Aloe vera).

Aloe vera is a succulent plant known for its thick, fleshy leaves filled with a clear, mucilaginous gel. This gel contains numerous bioactive compounds with medicinal, cosmetic, and nutritional value.

Polysaccharides (Acemannan, Glucomannan) (40- 60%). Glycoproteins.

Anthraquinones (Aloin, Aloe-emodin) (0.1- 0.5%). Vitamins (A, E, C) (0.01-0.05%).

Enzymes (1-3%).

Minerals (Zn, Mg, Ca) (0.5-1.5%).



2. NEEM



Fig.5 – Neem

indica

Leaves of Azadirachta

Antibacterial, antifungal, reduces

pimples - Nimbidin, Azadirachtin

□ FAMILY : Meliaceae.

□ GENUS : Azadirachta.

□ SPECIES : Azadirachta indica

Neem oil is a bioactive oil derived from the seeds of *Azadirachta indica*. It is extensively incorporated into anti-acne formulations due to its potent antibacterial, anti-inflammatory, antifungal, and antioxidant activities. Neem oil effectively inhibits the proliferation of acne-causing microorganisms such as *Cutibacterium acnes*, alleviates erythema and inflammation, and regulates excessive sebum secretion, thereby contributing to the prevention and management of acne lesions.



3. TURMERIC



Fig.6- turmeric

- Rhizomes of *Curcuma longa*

- Antimicrobial, reduces inflammation and scars – Curcumin

Curcuma longa (Turmeric) is a well-known medicinal herb commonly used in anti- acne herbal creams because of its powerful anti-inflammatory and antibacterial properties. The main active compound in turmeric is curcumin, which plays an important role in reducing skin inflammation and controlling acne.

In anti-acne formulations, turmeric is added to help reduce redness, swelling, and pain associated with pimples. Acne is often caused by bacterial growth and excess oil production. turmeric helps inhibit the growth of acne-causing bacteria and supports cleaner, healthier skin. Its anti-inflammatory action calms irritated skin and prevents the worsening of breakouts.

Turmeric also has strong antioxidant properties, which protect the skin

- Reduces inflammation, redness and antioxidant protection
- Controls acne causing bacteria
- Promotes faster healing of pimples
- Helps lighten dark spots and acne scars
- Improves overall skin tone and texture



4. Tulsi



Fig. 7– Tulsi

Leaves of *Ocimum sanctum* (also known as *Ocimum tenuiflorum*) Antimicrobial, adaptogenic, detoxifying, oil control

Eugenol, Caryophyllene, Ursolic acid, Rosmarinic acid

□ FAMILY: Lamiaceae

□ GENUS: *Ocimum*

□ SPECIES: *Ocimum sanctum*

Tulsi oil and leaf extracts are bioactive agents derived from the aerial parts of *Ocimum sanctum*. It is extensively incorporated into anti-acne formulations due to its potent broad-spectrum antimicrobial, anti-inflammatory, and adaptogenic (anti-stress) properties. Tulsi effectively disrupts the cellular structure of resistant acne-causing pathogens, clarifies the epidermal surface by removing accumulated toxins, and regularizes sebaceous gland activity, thereby contributing to the prevention and management of recurring acne breakouts.



5. Garlic



Fig.8- Garlic

- Bulbs of *Allium sativum*
- Antimicrobial and anti-inflammatory
- Allicin, Alliin, Ajoene, Diallyl disulfide

- FAMILY: Amaryllidaceae (formerly Liliaceae)
- GENUS: *Allium*
- SPECIES: *Allium sativum*

Garlic extract is a highly bioactive phytochemical agent derived from the crushed bulbs of *Allium sativum*. It is extensively incorporated into anti-acne formulations due to its unmatched broad-spectrum antimicrobial, anti-inflammatory, and fibrinolytic (tissue-softening) activities. Garlic effectively eradicates tough bacterial biofilms created by *Cutibacterium acnes*, prevents secondary infections in open acne wounds, stimulates localized microcirculation to accelerate cellular turnover, and inhibits the synthesis of inflammatory prostaglandins, thereby contributing to the prevention and management of moderate-to-severe acne lesions.





Fig.9-

- Natural bee product
- Antibacterial and moisturizing
- Flavonoids, Enzymes

- FAMILY: Apidae
- GENUS: Apis
- SPECIES: Apis mellifera

Honey is a complex biological substrate produced by *Apis mellifera*. It is extensively incorporated into anti-acne formulations due to its unique combination of osmotic antimicrobial, enzymatic anti-inflammatory, and structural tissue-repairing activities. Honey effectively inhibits the proliferation of *Cutibacterium acnes* through low water activity and continuous micro-generation of hydrogen peroxide, debrides cellular debris within the follicular infundibulum, maintains a balanced dermal pH, and accelerates re-epithelialization, thereby contributing to the prevention, management, and scar-free resolution of acne lesions

Honey possesses a broad range of pharmacological actions that make it ideal for acne treatment.

- Osmotic Antimicrobial – Exerts high osmotic pressure due to low water content (~17%), drawing water out of bacterial cells (such as *Cutibacterium acnes* and *Staphylococcus aureus*) to cause cell dehydration and death.
- Enzymatic Hydrogen Peroxide Generation – Contains the bee-derived enzyme glucose oxidase, which slowly synthesizes low, non-cytotoxic levels of hydrogen peroxide upon contact with skin moisture, providing a continuous, gentle sanitizing effect.
- Anti-inflammatory – Suppresses the production of inflammatory matrix metalloproteinases (MMPs) and limits neutrophil infiltration, rapidly reducing the erythema, edema, and tenderness of inflamed pimples.



7. Tea Tree Oil



Fig.10–Tea Tree Oil

- Reduces redness and irritation
- Promotes faster healing of pimples
- Helps fade acne scars gradually

Leaves and terminal branches of *Melaleuca alternifolia*

- Antibacterial, anti-inflammatory, antiseptic, oil control, pore cleansing
- Main Constituents
- Terpinen-4-ol, α -Terpineol, γ -Terpinene, Cineole, Terpinolene
- FAMILY: Myrtaceae
- GENUS: *Melaleuca*
- SPECIES: *Melaleuca alternifolia*

Tea Tree Oil is a volatile essential oil obtained by steam distillation of the leaves and young twigs of *Melaleuca alternifolia*. It is one of the most extensively

- Undiluted Tea Tree Oil may cause skin irritation, dryness, burning sensation, or allergic contact dermatitis in sensitive individuals.
- Excessive application may disrupt the natural skin barrier and produce localized erythema or peeling.



8.Sandalwood



Fig.11 - .Sandalwood

Wood of Santalum album
Santalol

Cooling effect, reduces redness and irritation

Sandalwood consists of the dried heartwood and volatile oil obtained from *Santalum album* Linn

Leaves of *Rosmarinus officinalis* Rosmarinic acid

Antioxidant and antimicrobial

Rosemary (formerly known as *Rosmarinus officinalis*) is an aromatic medicinal herb belonging to the family Lamiaceae. It is widely used in traditional medicine, cosmetics, and skincare preparations because of its antimicrobial, antioxidant, anti-inflammatory, and wound-healing properties. Rosemary essential oil and leaf extracts have gained importance in dermatological applications, particularly in the treatment and management of acne vulgaris.

Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit characterized by comedones, papules, pustules, cysts, and scars. The major causes of acne include excessive sebum production, blockage of hair follicles, bacterial



9. Rosemary



Fig.12 –

Vitamin C in lemon acts as a powerful antioxidant that neutralizes free radicals and protects skin cells from oxidative damage. It also promotes collagen synthesis and improves skin healing.

6. Scar and Pigmentation Reduction

Lemon is commonly used externally in the form of:

- Fresh lemon juice
- Face masks
- Cleansers
- Toners
- Essential oil formulations
- Herbal creams and gels

Lemon juice is often diluted with water, honey, or rose water before application to reduce skin irritation.

Lemon is frequently combined with herbal ingredients such as honey, turmeric, aloe vera, neem, and sandalwood for enhanced anti-acne effects.

Lemon extract and lemon oil are widely used in cosmetic and skincare products designed for oily and acne-prone skin.

- Natural and economical remedy
- Reduces excess oil production
- Possesses antimicrobial activity
- Helps exfoliate dead skin cells
- Improves skin complexion
- Reduces acne scars and pigmentation
- Rich source of Vitamin C and antioxidants



TABLE-2 Method of Preparation of Herbal Anti-Acne Cream Using Neem

Sr. No.	Ingredient	Function
1	Neem leaf extract	Antibacterial agent
2	Aloe vera gel	Moisturizer and soothing agent
3	Turmeric extract/powder	Anti-inflammatory agent
4	Beeswax	Thickening agent
5	Liquid paraffin or coconut oil	Oil phase
6	Borax	Emulsifying agent
7	Distilled water	Aqueous phase
8	Rose water	Fragrance and cooling effect
9	Preservative (optional)	Increase shelf life

Apparatus Required

1. Beakers
2. Measuring cylinder
3. Water bath
4. Glass rod
5. Mortar and pestle
6. Thermometer
7. Cream container

Method of Preparation

Step 1: Preparation of Neem Extract

- Collect fresh neem leaves.
- Wash thoroughly with clean water.
- Dry and grind the leaves into a paste.
- Filter the paste to obtain neem extract.

Conclusion

The study concludes that herbal formulations are a promising and safer alternative for the treatment of acne vulgaris. The formulations prepared using medicinal plants such as neem, aloe vera, turmeric, Tulsa, garlic, and honey possess significant antibacterial, anti-inflammatory, antioxidant, soothing, and wound-healing properties, which help reduce acne lesions, redness, excess oil production, and skin irritation.



The document highlights that acne is mainly caused by excess sebum production, blockage of hair follicles, bacterial infection, hormonal imbalance, stress, poor skincare habits, and environmental factors. The herbal ingredients selected in the formulation specifically target these causes by controlling bacterial growth, reducing inflammation, preventing clogged pores, and promoting healthier skin.

The prepared herbal cream, gel, and lotion were designed using simple pharmaceutical techniques and suitable excipients for topical application. Evaluation parameters such as lesion count, inflammation, oil production, skin irritation, pigmentation, and response to treatment are important for assessing the effectiveness and safety of the formulations.

Result

The herbal anti-acne formulations (cream, gel, and lotion) prepared using neem, aloe vera, turmeric, Tulsi, garlic, and other natural ingredients showed satisfactory physicochemical properties and good topical applicability. The formulations exhibited smooth texture, acceptable consistency, good spread ability, and suitable pH for skin application.

The formulations were found to be safe for topical use with minimal chances of skin irritation due to the natural origin of the ingredients. Stability studies indicated that the products remained stable under normal storage conditions without significant changes in appearance, texture, or Odor.

Among the prepared formulations, the herbal gel showed better patient acceptability because of its non-greasy nature, cooling effect, easy absorption, and pleasant feel on the skin. The cream formulation provided better moisturizing action, while the lotion was suitable for larger skin areas and oily skin types.

Overall, the study result suggests that herbal anti-acne formulations are effective, economical, and safer alternatives to synthetic acne treatments and can help improve skin condition, reduce acne severity, and enhance overall skin health.

REFERENCES

1. Ramli, R., Malik, A. S., Hani, A. F. M., & Jamil, A. (2012). Acne analysis, grading and computational assessment methods: an overview. *Skin research and technology*, 18(1), 1-14.
2. Dlugosz, A. A., Strickland, J. E., Pettit, G. R., & Yusra, S. H. (1992). The role of protein kinase C in epidermal differentiation and neoplasia. *The Environmental Threat to the Skin*, 309-312.
3. Sheth, A. H., Sen, D. J., & Doshi, N. B. (2011). New Researches on Acne Vulgaris. *Research Journal of Pharmacology and Pharmacodynamics*, 3(2), 48-57.
4. Ravisankar, P., Koushik, O. S., Himaja, V., Ramesh, J., & Pragna, P. (2015). Acne-causes and amazing remedial measures for acne. *J Pharm Res*, 5, 209-301.
- 12) Dusi, S. (2020). Formulation and Evaluation of Aloe Vera and Dacus Carota herbal.
5. Kanitakis, J. (2002). Anatomy, histology and immunohistochemistry of normal human skin. *European journal of dermatology*, 12(4), 390-401.
6. Holloway, S., & Mahoney, K. (2020). Peri wound skin care considerations for older adults. *British journal of community nursing*, 26 Sup6, S26-S33.
7. Baki G., Alexander K.S. Introduction to Cosmetic Formulation and Technology. John Wiley & Son, Inc.; 2015. CHAPTER 3. Skin care products; pp. 125–147. <https://sublimelife.in>
8. Rao, H. (2012). Therapeutic applications of almonds (*Prunus amygdalus L.*): a review. *Journal of clinical and diagnostic research*, 6(1), 130-135.
9. Kanitakis, J. (2002). Anatomy, histology and immunohistochemistry of normal human skin. *European journal of dermatology*, 12(4), 390-401.
10. Smit, N., Vicanova, J., & Pavel, S. (2009). The hunt for natural skin whitening agents. *International journal of molecular sciences*, 10(12), 5326-5349.



11. Gohil KJ, Patel JA, Gajjar AK, Pharmacology review on centella asiatica- potential herbal cure all Indian J Pharm science 2020.
12. Loe H, Kim H, Park J et al anti-inflammatory and wound healing effects of centella asiatica in skin disease 2020; 259.
13. WHO quality control method for medicinal plant material, Geneva: 2010.
14. Pavithra PS, Rao CM, Swetha c, et al pharmacological activities and therapeutic potential of centella asiatica a review in 2015.
15. Tungmurong N, Tungsukh ruthai S, Tungsukhruthai P, Effectiveness of centella asiatica in skin disease: Ethnophararol 2020; 259.
16. Akash E., Gunaseelan V., Jayanthan R., et al. (2025) A fresh 2025 study formulating a herbal cream using aloe vera, turmeric (*Curcuma longa*), neem, honey; evaluated for physicochemical properties, stability, and antimicrobial activity against acne-causing bacteria like *Propionibacterium acnes*, research and pharmacy.
17. BADDURI NIHAL, VISHAL GUPTA DV GOWDA, MANOHAR Formulation and

