

Formulation and Evaluation of Herbal Antiacne Cream

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ABSTRACT

The current study set out to create an herbal Antiacne cream that may be used to nourish, moisturize, and treat a variety of skin conditions. Different crude drugs like Aloe vera, Clove oil, Rose oil, Tea tree oil are used to formulate cream. The choice of components according to the various therapeutic qualities of the agents. Aloe vera has been reported moisturizing, antiacne, antibacterial, smoother skin properties. Tea tree oil, clove oil these ingredients also been reported to have antiacne properties, antioxidant properties, antiviral properties, anti-inflammatory properties. Aloe vera functions as an immune system enhancer and an anti-inflammatory, which helps to eliminate acne scars. The resulting cream aims to formulate effective, safe and natural solution for managing common skin concern, focus on non-toxicity, skin health, and efficacy, harnessing power of herbal ingredients known as Antibacterial, Moisturizing properties.

Keyword: Aloe vera, Clove oil, Rose oil, Tea tree oil, Antiacne, Herbal.

INTRODUCTION

Skin The skin makes up almost 15% of an adult's total body weight, thus making it the biggest organ in the body. It carries out a wide variety of important functions, including as preventing the body from absorbing too much water and helping in temperature regulation, in addition to providing protection against external physical, chemical, and biological hazards. The mucous membranes that line the body's surface are a continuous layer of skin. ^{1,2}

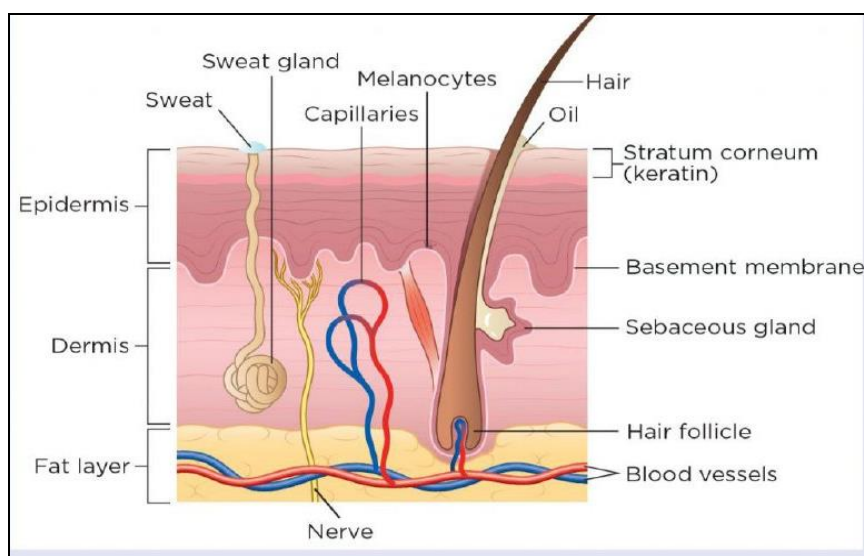


Fig.1: Structure of skin

Types of Skin:

Normal, oily, and dry skin types are the three primary varieties of skin.

- a) **Dry Skin:** Low moisture in dry skin causes it to become dry, tight, and hard. It also looks dull and dehydrated. Dry skin causes discomfort and increased sensitivity, which may result in irritation. A number of factors, including the environment, heredity, aging, and insufficient hydration, can contribute to dry skin. Frequent moisturization is essential for restoring moisture and preserving a healthy skin barrier; dermatitis or itch can develop from extreme dryness.
- b) **Oily Skin:** One of the characteristics of oily skin is excessive sebum production. Especially in the T-zone (forehead, nose, and chin), the skin appears oily or oily. Because too much oil blocks the pores, oily skin commonly has increased pores and is likely to acne, blackheads, and whiteheads. But oily skin has built-in protections against wrinkles and fine lines, so it grows more slowly.
- c) **Normal Skin:** Normal skin is regarded as balanced and healthy. It retains a natural moisture balance, is smooth to the touch, and is elastic. Normal skin types don't commonly develop skin problems because their skin isn't very dry or greasy. The skin appears clear, has evenly toned pores that are about the right size, and produces a healthy amount of sebum to keep the face moisturized without being overly greasy.³
- d) **Combination Skin:** Both dry and oily skin types are characteristic of this skin type. It is one of the most present skin types, with the T-zone (forehead, nose, and chin) usually exhibiting more oily skin, and the cheeks and sides of the face with both normal or dry skin.

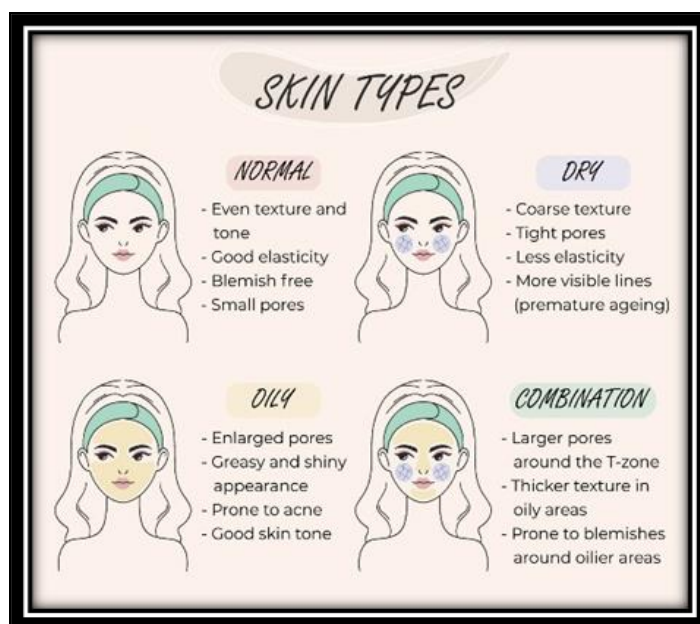


Fig.2. Structure of types of Skin⁴

Layers of Skin

Three main categories

- **The Epidermis Layer** - The skin's outermost layer, known as the epidermis, acts as the body's first line of fight against external chemicals.
- **The Dermis Layer** - Gives shape and flexibility to the epidermis and maintains it.
- **The Hypodermis** - Subcutaneous layer, is composed of muscles, adipose tissue.⁵

FUNCTION OF SKIN

- **Protection of Skin:** The skin's Langerhans cells, which are a component of the adaptive immune system, act as an anatomical barrier to prevent infections and harm between the inside and the outside.
- **Sensation:** Check somatosensory system and haptics. Consists of a range of nerve endings that respond to temperature, pressure, touch, vibration, and tissue damage.
- **Heat Regulation:** Because the skin's blood supply is far greater than what it needs, it is capable of controlling how much energy is released by heating, cooling, and conduction. Constricted blood vessels significantly lower cutaneous blood flow and keep heat, whereas dilated blood vessels increase flow and lose heat.
- **Control of Evaporation:** The skin acts as a semi-impermeable, mostly dry barrier against loss of water. High fluid loss in burns is due to of a breakdown of this process.
- **Endocrine:** The two lowest layers of the epidermis, the stratum basale and stratum spinosum, produce cholecalciferol (D3), which is one of our primary sources of vitamin D from the skin.
- **Water Resistance:** To prevent essential vitamins and minerals from going out of the body, the skin functions as a water-resistant barrier.^{6,7}

SKIN PIMPLE

A skin condition known as acne causes inflammation or infection in the oil glands. Of those between the ages of 11 and 30, it affects 3 out of every 4. Skin pimples generally show as a red, infected region of skin that breaks out of healthy skin. Though it can appear outside on the body, it usually affects the face. It can take on any form, but the most common shape is circular, and depending on the cause and stage, it can be red, black, or white in color. It can be put on by bacteria reaching into fat glands and infecting the skin, or it can be non-inflammatory due to fat gland blockage. Many medications are available to cure lesions and their scars, however they come with certain negative effects. Some fixed dose combinations are used to improve the efficacy and lessen the negative effects. The use of medicinal herbs as a potential source of therapeutic help has grown greatly in the global health systems for both humans and animals, not only in treating sickness but also as a potential resource for maintaining health. Medicinal plants have been used for centuries as a reliable and safe source of medicine in almost every human culture on the planet (about 75% of the global population). They are nature's secret and mostly unexamined resource.⁸

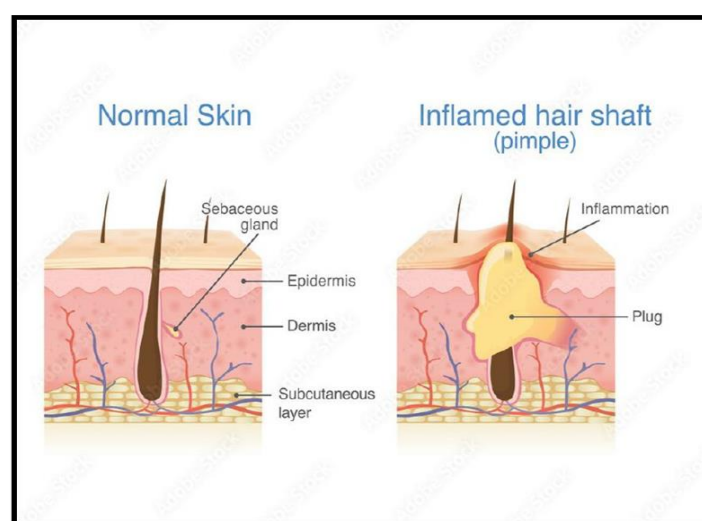


Fig.3. Structure of Normal skin and Pimple skin

Types of Pimples

A pilosebaceous layer inflammatory disease, acne vulgaris affects skin, mainly the face, chest, and back, which have a large number of glands that produce oils. Acne is caused by *Propionibacterium acnes* increasing the sebaceous glands' reactivity to normal levels of androgens in the blood.⁹

a) Non-inflammatory Acne

- 1) **Whiteheads:** These little pimples stay on the skin's surface.
- 2) **Blackheads:** When they appear dark and rise to the skin's surface, they are not the result of dirt buildup. Black heads are black in color; they are not black due of dirt. Typically, air causes the keratin protein to oxidize.¹⁰

b) Inflammatory Acne

- 1) **Papules:** Papules are little, sensitive pink pimples that are observable on the skin.
- 2) **Pustules:** Pustules, also known as infections or pimples, are visible on the skin's surface and are red at the base with pus at the top.
- 3) **Nodules:** Easily noticeable on the skin's surface. These are big, painful pimples that are visible on the skin's surface and penetrate deeply in the skin.
- 4) **Cysts:** Easily noticeable on the skin's surface. They are painful, pus-filled, highly deeply embedded and quickly heal.¹¹

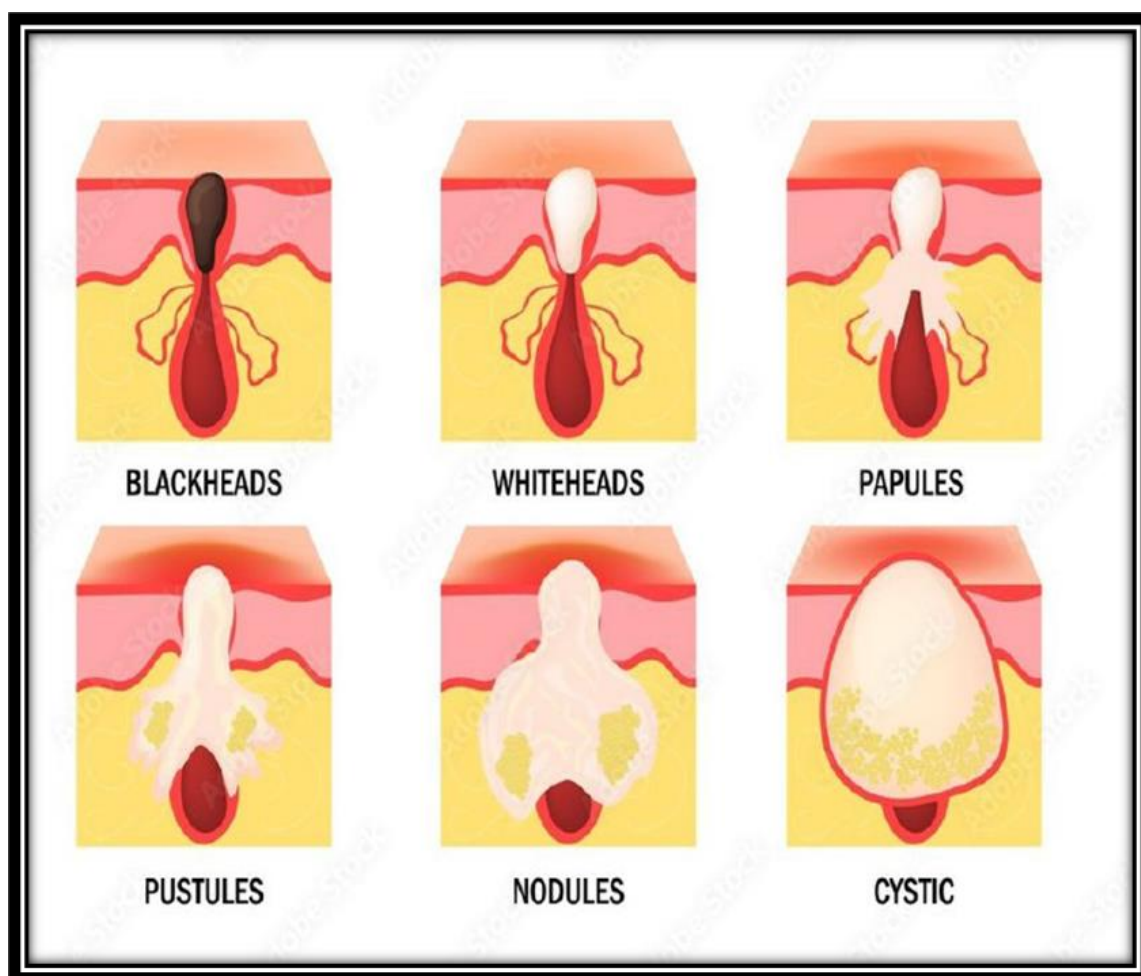


Fig. 4. Structure of types of Skin Pimple

Causes of Acne

- Hormone levels in women change during the menstrual cycle.
- Avoid or stay clear of junk food, pizza, and greasy/fried foods; these are bad for your overall health but don't promote or worsen acne.
- Hormonal alterations brought on by adolescence or pregnancy.
- Specific drugs, such as corticosteroids or birth control tablets.
- Washing too much to remove contaminants from acne can cause skin irritation and drying out. Thus, it is truly better to wash softly.
- Acne can be created on or made bad by prednisone, deltasone, orasone, prednisone-M, liquid red, and steroids that contain iodides, bromides, or injectable or oral steroids.
- Stress.
- Due to cosmetic use .¹²

Herbal Cosmetics

The term "herbal cosmetics" refers to products that contain more natural elements and have only the objective to give certain cosmetic benefits. The market for herbal medications is growing quickly because they have no side effects that are harmful. The only ingredient in herbal cosmetics is herbs and plants. ¹³

Natural herbs don't have any negative effects on skin health. Cosmetics are utilized nowadays to enhance one's appearance. To enhance their attractiveness, cosmetics are applied and prepared. ¹

Formulations such as skin protection, sunscreen, anti-acne, and anti-wrinkle, whether natural or synthetic, are available for a variety of skin conditions. When compared to synthetic formulations, herbal medications have no negative effects because of their rich qualities, which include anti-inflammatory, antiseptic, antibacterial, and antioxidant activities. ¹⁵

Advantages of Herbal Cosmetics

- Less damaging to the skin or other body parts because to its natural state .
- It has no negative side effects and helps to cleanse and beautify the body.
- Simple availability
- It increases the body's energy level.
- Variety of Phyto-constituents can be incorporated.
- It increases the immune system of the body without affecting the body's natural stability.
- Economical.
- Its high vitamin and mineral content give it great nutritional value.¹⁶

CREAM

The topical medications that can be applied to the skin are called creams. Creams are described as "viscous liquid or semi-solid emulsions of either the water-in-oil or oil-in-water type," with different consistency depending on the type of water and oil used . ¹⁷ Creams are used for medicinal or cosmetic functions, as well as for cleansing, beautifying, and improving appearances. These topical formulations are intended to deliver the medication locally, into the mucous membrane or the skin's underlying layer. These items need to be used topically in order to improve the site-specific administration of medication for skin conditions.¹⁸ The purpose of the cream is to treat any illness, prevent tan lines and acne, and soothe the skin in response to various environmental conditions. There are various kinds of creams, including

foundation, vanishing, cleansing, massage, hand, and body creams. Our primary goal is to create a herbal cream that will improve skin tone, minimize wrinkles, and lessen acne and skin irritation.^{19,20}

Types of Skin Cream

They are separated into two categories:

a) Oil in Water

- Dispersed Phase - Oil
- Continuous Phase – Water
- These are less greasy and more easily washed off using water. *e.g.* – Acetonide cream

b) Water in Oil

- Dispersed Phase – Water
- Continuous Phase – Oil
- These are Lipophilic or Hydrophobic in Nature.
- More difficult to handle. Example – Moisturizing cream²¹

Advantages of Total Drug Delivery system

- Easy to apply
- Avoidance of first pass metabolism
- Avoidance flatulence
- Self-medication
- Avoid of risk²²

SELECTION OF HERBS

The market for herbal cosmetics is growing as a result of new ingredients being available and the financial benefits of creating profitable products and upholding quality standards. Applied to the body are products known as cosmetics. Face creams provide a softening and cleaning effect when used as cosmetics. One the most significant medical systems that uses herbal plants and extracts for the therapy of a variety of diseases is the Ayurvedic system.²³ Since ancient times, aloe vera has been used to treat burns and infections. Still, developments in the field of cosmetology have demonstrated the significance of aloe vera as an ingredient in makeup. It is a miraculous plant for beauty because it has nearly 20 amino acids, enough amounts of calcium, magnesium, and salt, enzymes, vitamin polysaccharides, nitrogen, and other elements. Aloe vera has been reported moisturizing, antiacne, antibacterial, smoother skin properties.²⁴ Tea tree oil, clove oil these ingredient also been reported to have antiacne properties, antioxidant properties, antiviral properties, anti-inflammatory properties.

The selection of aloe vera as a main ingredient in our cream formulation. Aloe vera functions as an immune system enhancer and an anti-inflammatory, which helps to eliminate acne scars. Aloe vera-based beauty products have the potential to lessen the severity of acne. It is also made up of chemical components that have the ability to prevent acne from starting on the skin.^{25,26} Aloe vera gives off a feeling of freshness. It facilitates better blood distribution, which makes it easier for cells to exchange oxygen and provides them with food. Additionally, Aloe vera relieves itching and help in the healing of blister. Aloe has a B₁ vitamin content. Vitamins B₂, B₆, B₁₂, C which offer soothing feel for skin.²⁷

HERBAL INGREDIENTS USED IN CREAM

Aloevera [28]

Synonyms: *Aloe Barbadensis*, *Aloe*, *Aloe Indica*

Biological Source: Dried Juice of the leaves of *Aloe barbadensis* Miller (curacao aloes), *Aloe perryi* Baker (socotrine aloes).

Family: Liliaceae

Organoleptic properties

- 1) Colour: Depending on the variety that's been used. Its color possibly Black, Brownish black, or Dark black
- 2) Odour: Characteristic
- 3) Taste: Intensely bitter and Nauseating
- 4) Size: It is found in the form of masses of various size



Fig.5: Picture of Aloe vera

Chemical Constituents

There are seventy-five potentially active ingredients in aloe vera, including vitamins, enzymes, minerals, carbohydrates, lignin, saponins, amino acids, and salicylic acids

Uses

- 1) Antibacterial Activity
- 2) Anti-inflammatory Property
- 3) Antiacne Properties
- 4) Aloe vera can also be used to moisturize and soften skin.
- 5) Aloe vera has the ability to reduce facial pigmentation and dark patches

References: (29), (30), (31), (32)

CLOVE [33]

Synonyms: *Caryophyllum*, Clove Flower, Clove bud, Lavang

Biological Source: It consists Dried flower buds of *Eugenia Caryophyllus*

Family: Myrtaceae

Organoleptic Properties:

- Colour: Dark Brown
- Odour: Aromatic, Strong spicy
- Taste: Aromatic, Pungent, Bitter, and Spicy
- Size: Length (12-17mm), Diameter (3-4mm)



Fig.6: Clove

Chemical Constituents

- Volatile oil (15-20%)
- Eugenol (70-90%)
- Acetyl Eugenol
- Tannin (10–13%)
- β -caryophyllene (5–12%)
- α and β -humulene

Uses

- Anti-microbial Properties
- Antioxidant Properties
- Anti-inflammatory
- Anti-viral activity

References: (34), (35), (36)

ROSE OIL [37]

Synonym: Rose oil, Oleum rose

Biological Source: Rose oil extract from flower of *Rosa damascene*.

Family: Rosaceae

Organoleptic Properties

- Color: Pale Yellow
- Odour: Characteristic aromatic odour
- Taste: Fruity taste
- Solubility: Soluble in alcohol and vegetable oil and insoluble in water

Chemical Constituents

- (10-50%) rose oil
- Terpenes
- Glycosides
- Flavonoids
- Anthocyanins
- Vitamin C
- β -citronellol (14.5-47.5%)
- Nonadecane (10.5-40.5%)
- Geraniol (5.5-18%)
- Nerol and kaempferol

Uses

- Anti-ageing properties
- Heals cuts and Burns, Scarps



Fig.7: Picture of Rose

- Also help soothe skin irritation
- And act as sunscreen
- Prevent dark circles
- Anti-acne
- Anti-inflammatory effect

References: (38), (39), (40), (41)

TEA TREE OIL [42]

Synonym: Paperbark tree

Biological Source: Extract from dried leaves and terminal branches of *Melaleuca alternifolia*

Family: Myrtaceae

Organoleptic Properties

Colour: Pale yellow to nearly colourless.

Odour: Sharp camphoraceous



Fig.8: Tea tree oil

Chemical Constituents

- Terpinene-4-ol
- Gamma-Terpinene
- A-Terpinene Terpinolene
- 1,8-Cineole
- A-Terpineol
- P-Cymene
- A-pinene

Uses

- Anti-acne
- Antiviral
- Anti-bacterial
- Anti-fungal

Reference: (43)

REVIEW OF LITERATURE

Dhanashri Jadhav et al., (2024) Taro Leaves, *Aloe vera*, Spinach Leaves are medicinal plant which is used to make anti acne cream. The resulting cream had a neutral pH, good consistency and spread ability and no phase separation symptoms. It is safe to use the polyherbal anti-acne cream. These formulations are safe to use on skin and stable at room temperature.

Piyush B et al., (2024) Many medicinal plants, including rose oil, turmeric, *Aloe barbadensis*, and *Azadirachta indica*, are used to make the cream. Herbal cream that can be

applied on the skin to hydrate, and handle a range of skin issues. You can use the herbal cream as a barrier to protect your skin. Herbal cream that was created without chemicals protected the skin from various skin diseases. This formulation stable at room temperature.

Nishigandha Naresh et al., (2023) Formulation and Evaluation of the anti-acne cream for face with almond oil, manjishtha, and aloe vera. This ingredient is commonly used to treat acne and has additional properties like anti-aging, anti-inflammatory, and antibacterial properties. These creams are easily washable. these Cream does not cause irritation skin after use. The composition is safe at room temperature.

Srushti P. Kumbhar et al., (2022) Formulate and evaluate a herbal cream with funnel extracts for treatment of acne. The cream was tested for color, foreign particles, etc., and the presence of the active ingredient fennel was found to be White Color. It also passed all the parameters and was found to be easily spreadable on the skin's surface after application. These creams are stable at room temperature. These safe, effective, and non-toxic herbal anti-acne creams.

L. V. Vigneshwaran et al., (2022) Create and evaluate a herbal face cream that uses aloe vera gel, green tea extract, and turmeric as a skin toner. No of such negative effects are present in these creams. These creams are easily washable. The cream is safe to use topically and remained stable at room temperature. These formulations show anti-ageing, antiacne, smoothing property, anti-inflammatory properties, anti-bacterial, antiseptic.

Telange et al., (2022) Formulate and Evaluate antiacne cream by using natural ingredient Aloe vera and Turmeric. These preparations are used to treat infections or a variety of disorders. The formulation was evaluated using many factors, like pH, viscosity, spread ability, and stability. There is no indication of phase separation, and the formulation was easy to remove. It is safe to apply on skin. The slab process was used to formulate the cream. The cream can be readily washed and is non-irritating. The composition has less adverse effects than the commercially available synthetic cream.

Chandrashekhhar B et al., (2022) Aloe vera and cucumber are medicinal plant which are used in formulation of herbal cream they are work as strong laxatives. The formulation of cream done by slab method. And it passes the whole test and give good result. And it gives moisturizes our skin and enhances its clarity and appearance. These Formulation does not cause irritation and easy to wash.

K.S. Misar et al., (2020) Formulation and review of an anti-acne cream with clove oil. Using the agar well diffusion technique, all of the formulations were tested for antimicrobial activity against the microorganisms causing acne. Since clove oil works well as an anti-acne agent, adding it to anti-acne products can prove beneficial. Additionally, the compound shows antifungal and antibacterial qualities.

Nikhil Nitin et al., (2020) Formulate and evaluate a herbal cream with aloe vera gel, tulsi and neem extracts for multipurpose effects. Each of these plant-based compounds show antiacne properties, glowing properties etc. This formulation simple to wash. The compositions are safe to use topically and remained stable at room temperature. The formulations carried good phase separation, viscosity, Ph, and appearance.

Sharmila Dusi et al., (2019) Formulate and evaluate the herbal cream that has extracts from natural ingredients including *Daucus carota*, *Cucumis sativus*, and *aloe vera*. Formulations are to contain no negative side effects. The formulation shows no redness, no edema, irritation, inflammation. It is safe to use these formulations on skin. The formulation done by spreadibility, and stability, pH, viscosity test and all test give good result.

Archana Dhyani et al., (2019) To make the herbal cream that will be used to nourish, moisturize, and treat a variety of skin diseases like acne etc. The cream is made from a variety of crude medications, including *amla*, *Curcuma longa*, neem leaves, and *aloe vera* leaves. These formulations protect the skin from a variety of skin issues. The cream is also economical. It can be applied as a protective barrier for the skin. It is use to safe. And easy to wash.

Satpute KL et al., (2019) Formulation and evaluation of a herbal cream directed against this acne vulgaris etiologic agent. *Boswellia* oil are used in the formulation of herbal cream. The formulation done by pH, viscosity, spreadability, stability test and gives good result. There are a few clinical studies that support these plants' safety and efficacy in treating skin problems like acne. Their adverse effects are little. The formulation are safe at room temperature.

Mourya Aman* et al., (2017) “The Review of anti-acne cream for the prevention of acne”. cauliflower and *vinca* are medicinal plant which are used to Formulation of herbal cream and show skin healing property with antibacterial activity. These creams are easily remove from the skin. This cream done by physical evaluation, pH, washability, spreadability test. and all test gives good result.

Mullaicharam Bhupathyraaj et al., (2016) Turmeric, Thyme, Sandalwood are medicinal plant which are used to make anti-acne cream. Herbal anti-acne cream that is safe, effective, and increases patient compliance through the use of herbal extracts will be popular. The cream done by spread ability, greasiness, tackiness, film-forming, softening, comforting test and gives good result. These formulations have strong anti-acne properties as well.

CONCLUSION

The study investigated the antiacne, antibacterial, antioxidant, Anti-inflammatory Properties of *Aloe vera*, clove oil, rose oil, Tea tree oil in herbal antiacne cream formulation. *Aloe vera* and clove oil together offer a holistic approach to treating acne by treating inflammation, microbial overgrowth, sebum management, and skin repair in an anti-acne cream. The literature study highlighted the considerable number of research that supports the use of *aloe vera* and clove, tea tree extract in skincare products because of its antibacterial, anti-inflammatory, antioxidant, and anti-acne properties. Overall, the results highlight the importance of adding tea tree oil, rose oil, *aloe vera*, and clove to anti-acne cream formulations to offer a natural, safe, effective way to treat acne.

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