



Formulation and Evaluation Anti-Acne Cream from Watermelon Seed Extract

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ABSTRACT:

Nowadays, the majority of Indians suffer from acne vulgaris, a chronic skin condition. Acne is a persistent inflammatory skin disorder that is related to sebaceous glands. There are four main pathophysiologies associated with acne: inflammation, androgen-induced accelerated sebum hyper-production, altered follicular keratinization, and Propionibacterium acnes (P. acne). Many people now prefer using herbal medications over synthetic ones because of their fewer side effects. Ingredients like watermelon seed extract, also known as Rubia cordifolia, which grows near streams and rivers, are used to make our anti-acne face cream. It is commonly used to treat acne and has additional properties like anti-aging, anti-inflammatory, and antibacterial properties. Vitamin E-rich watermelon seed extract is beneficial and is primarily used to treat skin ailments. To determine whether a cream is acceptable for human skin, several assessment tests are carried out. These tests determine whether the cream causes irritation after being applied to the skin or not.

Objective: The current study's goal is to develop an anti-acne cream with watermelon seeds, to investigate the significance of acne for the treatment of common acne issues like blackheads, whiteheads, and pimples; to control and treat existing acne lesions; and to provide a natural, holistic approach to skin care without the use of harsh chemicals.

Purpose: The goal of anti-acne cream is to eradicate germs that cause acne. Some eliminate extra oil from the skin, while others hasten the production of new skin cells and the elimination of old ones.

Conclusions: Based on the study's findings, we can say that the anti-acne cream's formulation can keep sebaceous glands functioning normally while lowering excessive oil production by skin cells. It can help treat skin infections and prevent blackheads and whiteheads. It stops skin discoloration and inflammation. It can aid in maintaining a reduction in dryness and itching.

Keywords: , watermelon seed, Extraction, anti- acne cream, extract oil acne cream Formulation

INTRODUCTION:

According to medical terminology, acne vulgaris is a common skin condition that affects the oil glands located at the base of hair follicles. An infection of the skin is acne. The development of the sebaceous (oil) glands usually takes place throughout puberty. Male hormones generated by the adrenal glands of both sexes stimulate the aforementioned glands. "Common acne" is implied by the term acne vulgaris, which describes this type of acne. It is a skin illness brought on by modifications to the sebaceous glands.

The redness on the skin is caused by inflammation brought on by an underlying infection. A widespread skin condition that causes pimples, acne is prevalent among young individuals. Acne affects most people, but it particularly affects teenagers going through hormonal changes. The severity of acne can vary, resulting in different treatment options. Mild acne might be characterized by a few, infrequent pimples, moderate acne with inflammatory papules, or severe acne with nodules and cysts. Puberty, a time when a person transforms from a child into an adult, is associated with a high degree of hormone release and acne.

The prevalence of acne increases with age. Changes in the pilosebaceous units, or skin structures made up of a hair follicle and the sebaceous gland that sits next to it, are the cause of acne vulgaris, also referred to as acne. There are three types of acne symptoms: mild, moderate, and severe.

There are two forms of non-inflammatory lesions: closed comedons, commonly referred to as white heads, and open comedons, also known as blackheads. Inflammatory lesions include papules, pustules, cysts, and nodules. The primary features of acne vulgaris are seborrhea, comedones, inflammatory lesions, bacteria in the follicular canal, and sebum production.

Mechanism of acne:-

Acne is a prevalent skin ailment that has several contributing causes to its development and course. The causes of acne can be summed up as follows.

1. Increased Sebum Production Mechanism: Sebaceous glands generate more sebum (an oily substance) when they are stimulated by androgens, which are hormones like testosterone. Effect: An environment of oily skin caused by excessive sebum production can facilitate the development of acne.

2. Follicular Hyperkeratinization

Mechanism:- The shedding of keratinocytes, or skin cells, within the hair follicle increases abnormally. As a result, a clog known as a comedo forms, blocking the follicle. Open Comedones: Often referred to as blackheads, they are follicles that are partially obstructed and have a darker surface. Closed Comedones: Often referred to as whiteheads, these follicles are totally closed and have a flesh-colored or white surface. Effect: The obstruction can create an environment that is favorable to bacterial growth and limits proper sebum outflow

3. Colonization by Cutibacterium acnes (C. acnes)

Mechanism: The skin-normalizing bacteria C. acnes thrives in the anaerobic (low oxygen) environment that clogged follicles create. Impact: When C. acnes multiplies, the immune system reacts, resulting in inflammation and the development of inflammatory lesions such as papules, pustules, nodules, and cysts.

4. Inflammation

Mechanism: The presence of C. acnes triggers an immune response, including the release of pro-inflammatory cytokines. Additionally, the breakdown of sebum by bacterial lipases produces free fatty acids, which further contribute to inflammation.

Effect: Inflammation results in redness, swelling, and pus formation. In severe cases, it can lead to the development of painful nodules and cysts.

Summary of Acne Lesion Types:- A list of the different types of acne lesions: non-inflammatory lesions Whiteheads (closed comedones) and blackheads (open comedones) are two types of comedones. Lesions that are inflammatory:

1. Papules: Inflammatory, little, red, elevated bumps.

2. Pustules: Red, pus-filled, inflammatory lumps.

3. Nodules are substantial, painful lumps located deep within the skin.

4. Cysts: painful, deep, pus-filled lesions that may leave scars.

Factors responsible for acne:

P. acne, or Propionibacterium acnes Modifications to follicular keratinization

- Inflammation Androgen-stimulated increased hyperproduction of sebum
- Drugs. Because of the Cosmetics Applied
- Tension
- Menstruation and Hormonal Changes Pressing on the Pimples. Nutrition Genetics
- Excessive Use of Cleansers for Face Cleaning

Treatment of acne

Mild acne: anti acne face cream

Moderate acne: Topical retinoids/ antibiotics

Severe acne: Hormonal therapy

To overcome this problem there are several medications prepared by the Pharmaceutical Industry like, anti acne pills,

lotion, moisturizer, creams etc. Cream is a type of semisolid emulsion that is either oil in water (o/w) or water in oil

(w/o), and both of these semisolid emulsions are meant to be applied externally.

Cream is categorized as an emulsion of water and oil. It is applied to the outermost or most superficial layer of the skin,



and its main benefit is that it lasts longer at the application site. The cream's role is to soothe the skin, heal infections, remove tans and acne, and protect the skin from various environmental conditions. The cream is applied on the skin

BENEFITS OF TOPICAL DRUG DELIVERY SYSTEM:-

Preventing first-pass metabolism.

The ability to quickly stop taking the drugs if necessary.

A rather broad application area when compared to the nasal or buccal cavities.

The ability to more precisely target a specific spot for medicine delivery.

Utilizing medications with a brief biological half-life and enhancing pharmacological and physiological response.

Patient compliance will be improved

DRAWBACK TOPICAL DRUG DELIVERY SYSTEM:-

The possibility of skin irritation or contact dermatitis as a result of the medication or its excipients.

Poor skin absorption of several medications.

The potential for allergic responses.

Only for medications whose function depends on very low plasma concentrations

Drugs may be denatured by enzyme epidermis

Bigger-particle drugs are more difficult to absorb via the skin.

PLANT PROFILE :-

Watermelon seed.

Synonym:- *Citrullus lanatus*

Family:- cucurbitaceae

Chemical constituent:- linoleic acid. oleic acid essential omega 6-fatty acid

Propertis:- proteins , minerals, fats, vitamin, phytochemicals, carotenoids alkaloids, carbohydrates, vitamin E

Use :- Anti oxidant treat acne . Overall skin appearance moisturizer for dry skin.

DURG PROFILE:-

Omega-6 fatty acid

Drug name:- Omega-6 fatty acid

Chemical name:- linolenic acid

Chemical formula:-

$\text{CH}_3(\text{CH}_2)_4(\text{CH}=\text{CHCH}_2)_x(\text{CH}_2)_y\text{COOH}$

Propertis:- despite the urge you may have to dry

out oily skin to treat acne.

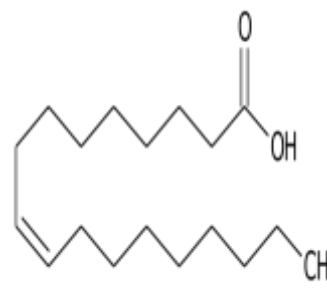
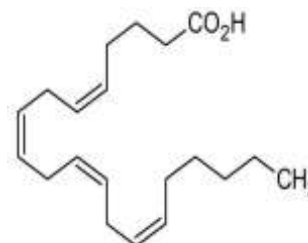
As a nutrient helpful for reducing acne

Solubility :- linoleic acid soluble in many organic solvent.

Oleic acid

Drug name:- Oleic acid

Chemical formula:-



C18H34O2 (CH₃(CH₂)₇CHCH(CH₂)₇COOH)

Properties:- the moisturizing effect of oleic acid may help promote.

Plump and smooth skin and may lessen The visibility of fine line and wrinkles Anti aging properties.

Solubility:- soluble in ethanol ether chloroform.

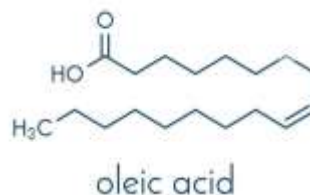
Linoleic acid

Drug name:- Linoleic acid

Chemical formula:- C₁₈H₃₂O₂

Properties:- linoleic acid anti inflammatory agent that Reduce acne and retains Helping Protect the skin against the acne.

Solubility:- soluble in water and acetone.

**EXPERIMENTAL WORK : -****MATERIALS AND METHODS****Apparatus:-**

500 ml soxhlet-extractoion apparatus, 500 mls round bottom flask, digital weighing balance, heating mantle, reflux condenser , refractometer, viscometer, manual grinder, water-phase pot, oil-phase pot, wooden rod for stirring,

Chemical:-

phenolphthalein, diethyl ether, ethanol, potassium iodide, Wijs solution, glacial acetic acid, chloroform, sodium thiosilphate, starch soluble, hydrochloric acid, carbon tetrachloride, alcoholic potassium hydroxide solution, etc. for skin lotion formulation include; stearic acid, emywax white, sorbitol, triethanolamine, fragrane, microcare, propyl parabene, methyl parabene, vitamin E, water melon seed oil

Sample Preparation:

The watermelon fruits that were used to extract the seeds were bought at Uli Central Market. Selected fully ripe fruits were gently sliced with a sharp knife, cleaned in clean water, and the seeds were delicately extracted from the juicy pod. After carefully washing the chosen seeds to get rid of the exterior sticky coats, they were sun-dried and kept in storage pending additional steps.

Soxhlet-extraction of the watermelon seed Oil**Procedure :**

- 1) In this method, 10gm coarsely ground crude drug is placed in porous bag or thimble made up by strong filter paper which is placed in chamber of the Soxhlet appratus.
- 2) Put the round bottom flask in heating mental & add some glass beds to the flask to avoid bumping.
- 3) Add suitable solvent like ethanol, methanol, ethyl acetate, chloroform etc by using funnel tcondensero the top of tube of condenser then it passed to the soxhlet chamber.
- 4) The solvent is pass through the drug material in soxhlet chamber to siphon tube & when sufficient amount of solvent is pass to the level of siphon tube then the solvent drips into the round bottom flask.
- 5) The extracting solvent in flask is heated at the temperature of boiling point if the solvent (70-80°c) & vapour is pass through the vapour tube to the condenser & vapour is condensed in .
- 6) When vapour is condensed then it coverts into liquid & liquid is drips into the thimble containing crude drug drop by drop.
- 7) This solvent with dissolved chemical constituents fills the chamber & also fill siphon tube.
- 8) When level of this solvent rises to the return point of siphon tube then it falls to the round bottom flask & completes one cycle & it repeates for 3 times. It is continues process.



Fig:- soxhlet Apparatus

Phytochemical tests:-

1) Bromine test:-

1. The organic compound to be tested is taken in a test tube.
2. Dissolve it in 2ml of distilled water.
3. Add bromine water drop wise with constant shaking.
4. If the orange red colour of bromine disappears then the given organic Compound is unsaturated.



Fig:- Bromine test

2) Thin Layer Chromatography (TLC) :-

1. Preparation of the TLC Plate:

Draw a faint pencil line about 1-2 cm from the bottom edge of the plate (baseline).

2. Sample Application:

Dissolve the fatty acid sample in a suitable solvent (e.g., chloroform or hexane).

Using a capillary tube or a micro-pipette, apply small spots of the sample solution along the baseline of the TLC plate. Apply standard fatty acids as reference points for comparison

3. Development of the Plate:

Place the TLC plate in a developing chamber containing a solvent system (mobile phase). Common solvent systems for fatty acids include hexane/diethyl ether/acetic acid (80:20:1)

4. Drying the Plate:

Once the solvent front is about 1-2 cm from the top of the plate, remove the plate from the chamber.

Mark the solvent front with a pencil and allow the plate to dry completely.

5. Visualization:

Spray the plate with a suitable visualization reagent, such as a solution of iodine vapors, phosphomolybdic acid, or ninhydrin, depending on the specific fatty acids being analyzed.

6. Observations:

Position (Rf Value): The Rf value (retention factor) is calculated for each spot:

$R_f = \frac{\text{Distance traveled by the compound}}{\text{Distance traveled by the solvent front}}$

Distance traveled by the compound

Compare the Rf values of sample spots with those of the standard fatty acids to identify the components

6. Identification:

Compare the Rf values of the spots from the sample to those of known standards. Matching Rf values indicate the presence of similar fatty acids.



Fig:- TLC TEST

Formulation Table:

Sr.no.	Ingredients	Formulation f1	Formulation f2	Formulation f3
1.	Watermelon seed extract	3.5 ml	6.5 ml	7 ml
2.	Beeswax	3 g	6 g	6.5 gm
3.	Liquid paraffin	10ml	15 ml	15 ml
4.	Borax	0.2 g	0.4 g	0.5 g
5.	Methylparaben	0.02 g	0.04 g	0.05 g
6.	Distilled water	5 ml	10 ml	10 ml
7.	Rose oil	0.1 ml	0.2 ml	0.2 ml

Formulation of cream:-

In a borosilicate glass beaker, heat liquid paraffin and beeswax to 75 °C and keep it there. Phase of oil. Borax and methylparaben should be dissolved in distilled water in a different beaker, and the mixture should be heated to 75 °C to produce a clear solution. (Phase of water). The heated oily phase should then gradually receive this watery phase.

Next, incorporate a precise quantity of watermelon seed oil. Mix it well until a creamy cream develops. Then, for aroma, add a few drops of rose oil. Spread this cream out on the slab, stir it with a few drops of distilled water if needed, and use a geometric motion to blend all the components together and give the cream a smooth consistency.

This process of preparing cream is known as the slab technique or the extemporaneous approach.



Fig:- Preparation of cream (For different cream formulations F1.f2.f3.)



Fig:- Formulation of cream

Evaluation Parameters:-

The following parameters were checked to evaluate the anti-acne cream:

1. Determination of the type of emulsion A scarlet red dye was mixed with the cream.

A drop of the cream was placed on microscopic slide and examined under a microscope.

If the disperse globules appear red the continuous phase colourless, the cream is oil in water (o/w) type. The reverse condition is occurs water in oil (w/o) type cream.

2. pH of the cream

The pH meter was calibrated using standard buffer solution. About 0.5 g of the cream was weighed and dissolved in 50 ml of distilled water and its pH was measured. pH of the cream base was found to be in range of 6.2- 6.9 which is good for skin pH.

All the formulation of cream base were shown pH nearer to skin required

Formulation.	pH
F1.	6.4
F2.	6.2
F3.	6.9

3. Homogeneity

The uniformity of the formulation was assessed through touch and appearance. By pressing a tiny amount of the prepared cream and gels between the thumb and index finger, homogeneity and texture were examined. The texture and homogeneity of the formulations were assessed based on their consistency and the existence of coarse particles.

4. Appearance

Visual Appeal The color, pearlescence, and roughness of the cream were used to score its appearance. Because creams contain more oil than lotions or gels, they have a thicker, creamier texture than those other products. Creams feel opulent and cozy on the skin because of their silky, emollient nature. The formulation was tested for homogeneity by visual appearance and touch.

4. Appearance

The appearance of the cream was judged by its color, pearlescence and roughness and graded. Creams have a thicker, creamier texture than lotions or gels because they contain more oil than those alternatives. The texture is smooth and emollient, making creams feel luxurious and comforting on the skin.

5. Washability:-

The hand was treated with a modest amount of cream and then rinsed with tap water.

6. Removal

By using tap water to wash the area where the cream was applied, the cream's ease of removal was evaluated.

7. Stability study

In order to conduct the stability study, the anti-acne cream was kept for two months at three distinct temperatures: 8°C, 27°C, and 40°C.

8. Spread ability test

The cream sample was applied between the two glass slides and was compressed between the two-glass slide to uniform thickness by placing 100 gm of weight for 5 minutes then weight was added to the weighing pan. The time in which the upper glass slide moved over the lower slide was taken as a measure of spread ability.

Spread ability = $m \cdot l / t$

Where, m = weight tight to upper slide

l = length moved on the glass slide

t = time take

RESULT AND DISCUSSION :-

Three samples of anti-acne cream with different compositions were prepared, keeping in mind all the conditions and circumstances faced during acne problem. In these, anti-acne agents were added to give relief of pain and also the redness caused during inflamed acne formation. The sample #f1 and #f2 exhibited much better potential with negligible side effects although other samples also showed well results for the treatment of acne.

1) identification test of Citrullus lanatus (fatty acid)

Table: identification test

Test name	Procedure	Observation
Bromine test	2ml sample + 2ml water + bromine 2 drop constant shaking	Solution turns orange to colourless
TLC test	1% solution prepared methylene chloride + ethyl acetate + hexane + dot the sample 0.1ml	1.5 cm sample was moved Mixture and identify the compound

2) Evaluation parameter of Anti acne cream**Table 2. Evaluation of cream**

Formulation	F1	F2	F3
Colour	Cream	Cream	Cream
Odour	Bitter	Bitter	Bitter
Apperance	Glossy	Glossy	Glossy
Consistency	Excellent	Excellent	Excellent
pH	6.4 +_ 7.0	6.2 +_ 7.0	6.9+_7.0

CONCUSSION :-

Based on the results of this study we can conclude that the formulated Anti acne cream can maintain Normal Function of sebaceous glands and reducing excessive oil production from skin cells. It can help prevent Whitehead and blackhead, treat skin infection. It prevents irritation and skin discoloration. It can help To maintain reduces itchiness and dryness.

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