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Formulation and Evaluation of Anti-Acne Herbal Cream



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ABSTRACT

Acne by definition is multifactorial chronic inflammatory disease of pilosebaceous units. Propionibacterium acnes and staphylococcus epidermidis are considered as the major skin bacteria that cause the formation of acne. Although acne does not pose serious threat to general health, it is one of the most socially distressing conditions especially for adolescents. In the present study, poly herbal anti acne cream was prepared using extracts of the plants Tulsi, aloe vera along with base materials. The plants have been reported in the literature having good anti- microbial, anti- oxidant and anti-inflammatory activity. Five formulations of the cream were prepared by varying the proportions of polymers and evaluated for their physicochemical property like pH, spreadability, viscosity, homogeneity, appearance, after feel and spreadability like tests. Among the 5 formulations the formulations 3 and 4 shows better results in evaluation. The main objective is to prepare a cream with natural herbal extracts and minimize the side effects of the chemical cosmetics. Acne vulgaris is a common skin disorder which affects containing the most extensive oil glands, including the face, back and trunk. Propionibacterium acne, an anaerobic pathogen, plays an important Part in the pathogenesis of acne. It has also participated in the Production of inflammatory acne by its ability to activate Antioxidants and metabolize sebaceous triglycerides into fatty acids, which draw neutrophils chemotactically. Acne is one of the most socially distressing skin disorders, particularly for teens, who have to cope with a disfiguring disease that erupts just When sexual maturity makes them maximum sensitive about their Appearance. Moreover, permanent scarring of the skin due to severe Acne leads to social distress throughout the entirety of adulthood. The modification and progress of acne is due to abnormal keratinocyte Proliferation and desquamation leading to ductal obstruction. Androgen driven sebum production enhances proliferation of P. acne. Excessive production of sebum block the pores and resulted in Inflammation. For many years, the use of antibiotics has shown Against vulgaris. Nevertheless, the prevalence of antibiotic resistance Within the dermatological setting has been increased. The progress of Antibiotic resistance is multi-factorial, including the specific nature of the relationship of the bacteria to antibiotics, how the antibacterial is Used, host characteristics and environmental factors]. To avoid the problem of antibiotic resistance, researches on medicinal plants have been done as alternative treatment for the disease.



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INTRODUCTION:

We have used three herbal ingredients in our preparation which are Aloe Vera gel, neem, Tulsi. Aloe Vera gel is used as a moisturizer, to reduce pimples and acne and also used for treatment of burn wounds. Neem is used as an antifungal and anti-inflammatory and it is also used to reduce scar, pigmentation, redness and itching of the skin. Tulsi is used to add glow to the skin and to promote wound healing and remove acne.

Cream is defined as semisolid which are oil in water (o/w) or water in oil (w/o) type and these semisolid emulsions are Intended for the external application. Cream is classified as oil in water and water in oil emulsion. It is applied on outer part or Superficial part of the skin and its main ability is to remain for a longer period of time at the site of application. The function of the Cream is to protect the skin against different environmental condition and give soothing effect to skin and treat any infection as well As tan and acne.

There are different types of the creams like cleansing, cold, foundation, vanishing, massage, hand and body cream. The main aim of our work is to develop herbal cream which can give effect like reduce acne and skin irritation, wrinkles and also Adding glow to the skin. Acne is a disturbing issue especially for teenagers and adolescence according to global statistics approximately 85% of Population will suffer this skin issue at age around 12-25 years, nearly 8% adult at age 23-24 years old and only 3% of adult having Acne at age 35-44 years old. Propionibacterium acne and staphylococcus aureus were responsible for acne since the presence of This bacterium in the sample isolated from acne patient at the same time, the increasing number of resistance of acne inducing bacteria Towards the antibiotic is a worrisome problem. The interest of consumer towards the natural bioactive compound has a functional Ingredient in the cosmetic product has arisen due to their various health beneficial effect.

Beside their nutritional and sensorial Properties also their potential effect in improving skin health has been recognized has acting as protective agent. Although, some skin issue can categorized as self- limiting but it also can give negative psychosocial consequences to individual by having low social withdrawal due to embarrassment and at the worst scenario it can leads to suicidal ideation. We have used to herbal ingredient in our preparation which are Aloe Vera extract and Tulsi extract. Aloe Vera is used as moisturizer and anti-acne. Also used for treatment of burn wound. Aloe Vera is first active ingredient and Tulsi is second active ingredient in it. And last one is neem.

1. Cosmetological importance of aloe Vera:



It is used seen ancient times Healing infection and burns. However with the improvement in cosmetology, it has been proved that Aloe vera is a very important component of cosmetics. It contains almost 20 amino acids, minerals like calcium, magnesium and sodium in sufficient quantities, enzymes, vitamins, polysaccharides, nitrogen and other components that make it a miracle beauty herb.

Some of the most important applications of Aloe vera for purpose of Cosmetology are being explained here briefly.

1) Itching and Blisters :

Aloe vera also provides relief from itching and also helps to treat blisters. Aloe contains vitamin B1, B2, B6, B12 and vitamin C that provide soothing and pleasing sensation to skin.

2) Skin Aging:

Aloe vera initiates the synthesis of elastin as well as collagen. These proteins are essential for preventing the aging of the skin.

3) Acne:

Aloe vera helps to eradicate acne scars by performing as an immune booster and an anti-inflammatory agent. Beauty products composed of Aloe vera may diminish the rigorousness of acne. It is also composed of the chemical ingredients which have the property to save the skin to initiate the acne.

4) Freshness:

Aloe vera impart the sensation freshness. It helps in increasing distribution of blood therefore providing easier oxygen exchange among the cells, hence giving them nourishment.

5) Sun-burns:

Aloe Vera has an outstanding possession in diminishing the hurting of sunburn. For this purpose, it is rubbed directly on skin. The fresh fluid from the plant or Aloe vera containing after-sun creams may be used for sun-burns.

6) Moisturizing Agent:

Aloe vera may also be used for softening and moisturizing the skin. There are so many products available in the market containing Aloe vera which may be used post-showering to obtain the skin in super soft shape. Aloe vera gel, cream or lotion applied on the face forms a be injurious to the skin. Pigmentation Melanin is a pigment which is responsible for the color of the human skin. Hyper pigmentation is a situation in which large amount of melanin is synthesized. This generally happens due to excess exposure of the skin to the sun. In reaction to UV rays in sunbeams, the skin cells called melanocytes initiate to synthesize melanin. This increased synthesis of melanin is responsible for the emergence of darkened patches on the skin. Aloe vera has the property of diminishing the pigmentation and dark spots on the face.

Aloe vera containing creams are beneficial for skin eruptions. Aloe vera gels have been proved to be the best remedy for burns and wounds. Actually, cellular regeneration, anti-bacterial and anti-fungal activities of Aloe vera make it useful for skin eruption.

2. Cosmetological importance of Tulsi:



The numerous skincare advantages of Basil leaf or Tulsi herb make it a great supplement to any beauty routine. Here are some of the ways Tulsi can transform your skin.

Tulsi is a versatile plant with numerous benefits for the skin and whether you have dry, sensitive, acne-prone or ageing skin, incorporating Tulsi into your skincare routine can help transform your skin and give you a healthy, youthful glow. Hence, beauty and skincare experts often suggest to go ahead and try Tulsi, from holy basil to the holy grail, for your skin.

Basil leaves in beauty, skincare routine: 5 ways Tulsi can transform your skin.

Tulsi, also known as the Holy Basil, is a plant with a rich history of medicinal and spiritual significance in Indian culture. It has been used for centuries in Ayurvedic medicine to treat a variety of ailments and it is also considered a sacred plant in Hinduism but did you know that Tulsi can also revolutionize your skincare routine?

1. Anti-Ageing Properties

Tulsi is a plant that is rich in antioxidants, making it an excellent addition to any anti-ageing skincare routine. Tulsi can aid in preventing skin damage from free radicals, which speed up the ageing process. Its high antioxidant content also aids in the reduction of inflammation and

redness, both of which contribute to the appearance of ageing. By using skincare products with Tulsi extract or oil, you can harness its anti-aging properties to keep your skin looking youthful and healthy.

2. Acne Treatment

The plant has natural anti-bacterial and anti-inflammatory properties that make it an effective treatment for acne. Due to its anti-bacterial characteristics, it can help eliminate the germs that cause breakouts, which is what causes acne. In addition, it can help reduce inflammation and unclog pores, which are also factors that contribute to acne. By incorporating skincare products with Tulsi extract or oil into your routine, you can help clear up acne and prevent future breakouts. Tulsi can be an effective weapon in your skincare toolbox, whether you have moderate or severe acne.

3. Skin Brightening

Tulsi contains high levels of vitamin C, making it a natural skin-brightening ingredient. A potent antioxidant, vitamin C lessens the appearance of dark spots and hyperpigmentation, which helps to brighten and even out skin tone. Using skincare products with Tulsi extract or oil can help bring radiance and a healthy glow to the skin. Additionally, its anti-inflammatory properties can help reduce redness and irritation, which can contribute to a dull complexion. If you're looking to brighten your skin and achieve a more even complexion, incorporating Tulsi into your skincare routine can be a great choice.

4. Moisturizing

Due to its inherent moisturizing qualities, Tulsi helps moisturize and soften the skin. It contains essential oils that can provide deep nourishment to the skin, making it an excellent ingredient to use in products for dry or dehydrated skin. By using skincare products with Tulsi extract or oil, you can help restore moisture to your skin, leaving it feeling soft and supple. Whether you're looking to prevent dryness or just want to maintain healthy, moisturized skin, Tulsi can be a great addition to your skincare routine.

5. Soothing

Tulsi has natural soothing properties that can help calm and relieve skin irritation. It contains eugenol, a compound with anti-inflammatory and analgesic properties that can help soothe and reduce skin redness and inflammation. Tulsi is also rich in antioxidants that can help

protect the skin from environmental stressors, which can contribute to irritation and sensitivity. By incorporating skincare products with Tulsi extract, you can help reduce skin irritation and promote a healthy, calm complexion.

3. Cosmetological importance of neem leaves:



1. Promotes collagen production

Vitamin C is abundant in neem, which aids in the natural creation of collagen and infuses the skin with antioxidants to reduce fine wrinkles.

2. Lighten Scars

Neem oil enters deeply into the skin and helps to lighten the scars. As a result, it minimises the appearance of scars and spots by increasing collagen formation and enhancing skin flexibility.

Acne, pimples and burns can be treated with neem paste. Neem paste also aids in the treatment of scars.

3. Purifies the blood

Neem has been high in natural antioxidants because of its powerful blood purifier. It is also known to help support important organs like the liver and kidneys, which help the body eliminate waste and toxins.

Neem aids in the reduction of toxin levels and the prevention of skin disorders such as acne, eczema, and rash. Neem possesses the properties of Tikta (bitter) and Kashaya (astringent), which make it a blood purifier to help with a variety of skin ailments.

MATERIALS AND METHODS

Collection of plant material

Aloe Vera, Neem, Tulsi leaves were collected from the local botanical garden of DR. D Y Patil college, Akurdi, Pune.

Excipients and herbal ingredients with their roles

Table 1: Role of ingredients

| S. No | Ingredients | Roles |
|-------|-----------------|---|
| 1. | Aloe Vera gel | Anti-ageing, anti-inflammatory, moisturizer, reduce acne and pimples. |
| 2. | Tulsi | Antibacterial, adds glow to the face. |
| 3. | Neem | Promote wound healing, relieves skin dryness, itching and redness. |
| 4. | Bees wax | Emulsifying agent, stabilizer and gives thickness to the cream. |
| 5. | Liquid paraffin | Lubricating agent |
| 6. | Borax | Alkaline agent which reacts with emulsifying agent to form soap |
| 7. | Methyl paraben | Preservative |
| 8. | Rose oil | Fragrance |

Extraction processes

1] Aloe Vera gel

Mature, healthy and fresh aloe Vera leaves were collected and washed with distilled water. Then after proper drying of leaves in hot air oven, the outer part of the leaf was dissected longitudinally using a sterile knife. Then the aloe Vera gel that is the colourless parenchymatous tissue was removed using the sterile knife. Then it is filtered using muslin

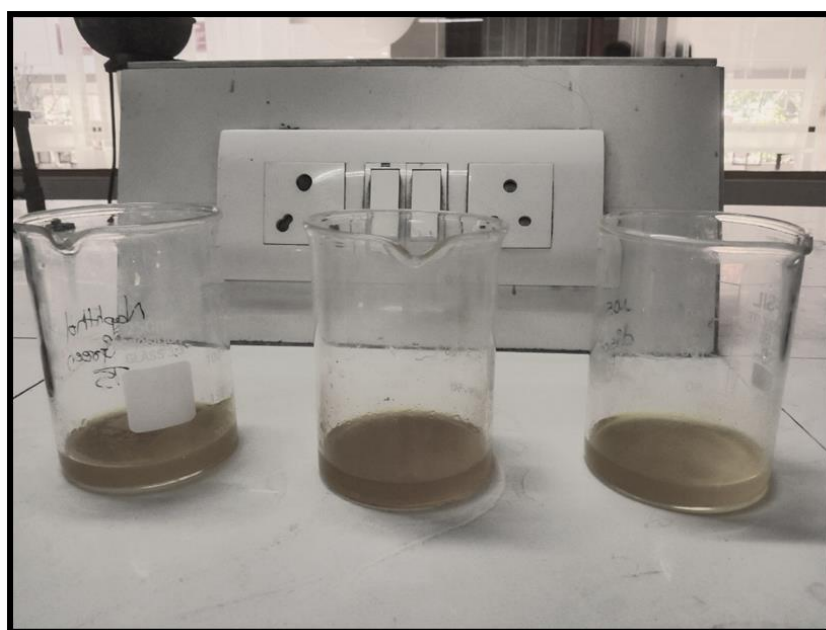
cloth to remove the fibres and impurities. Then the filtrate or the filter product which is a clear aloe Vera gel was used in the preparation.

2] Extraction of neem leaves

Neem leaves were collected and washed with distilled water and dried in hot air oven. After proper drying, leaves were powdered. Then 5g Neem leaves powder, 80 to 100 degree Celsius. dimethyl sulfoxide was taken in a volumetric flask and shaken for 3 d on REMI RSB-12 mechanical shaker. Then the solution was heated on a water bath at 80-100 °C and concentrated up to 20 ml and then filtered using muslin cloth to remove impurities. Then the filtrate or filter product obtained, which is a clear solution or clear extract of Neem leaves, was used in the preparation.

3] Extraction of tulsi leaves

Tulsi leaves were collected and washed with distilled water and dried in hot air oven. Then after proper drying, the leaves were powdered. Then 1g Tulsi leaf powder+10 ml dimethyl sulfoxide was taken in a volumetric flask and then shaken for 3 d on REMI RSB-12 mechanical shaker. Then the solution was heated on water bath at 80 to 100 degree Celsius. for few minutes and then concentrated up to 5 ml and filtered using a muslin cloth to remove impurities. Then the filtrate or the filter product in which a clear solution or clear extract of Tulsi leaves was used in the preparation.

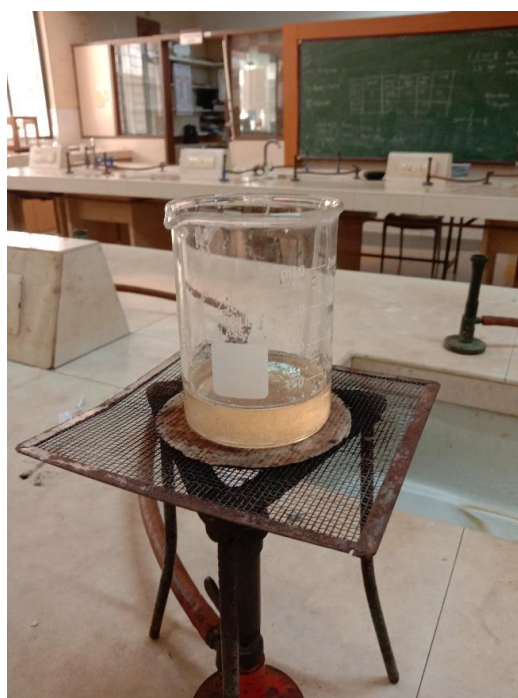


Formulation of cream

Heat liquid paraffin and beeswax in a borosilicate glass beaker at 75 °C and maintain that heating temperature.(Oil phase).



In another beaker, dissolve borax, methylparaben undistilled water and heat this beaker to 75 °C to dissolve borax and methylparaben and to get a clear solution. (Aqueous phase).



Then slowly add this aqueous phase to heated oily phase.



Then add a measured amount of aloe Vera gel, Neem extract, and Tulsi extract and stir vigorously until it forms a smooth cream.



Then add few drops of rose oil as a fragrance.



Put this cream on the slab and add few drops of distilled water if necessary and mix the cream in a geometric manner on the slab to give a smooth texture to the cream and to mix all the ingredients properly.



This method is called as slab technique or extemporaneous method of preparation of cream.



Fig. 3: Cream formulations

Batches of cream formulation:

| S. No. | Ingredients | Formulation F1H | Formulation F2H | Formulation F3H |
|--------|-----------------|--------------------|--------------------|--------------------|
| 1. | Aloe Vera gel | 1.5 ml | 1 ml | 1 ml |
| 2. | Neem extract | 0.5 ml | 0.2 ml | 0.4 ml |
| 3. | Tulsi extract | 1.5 ml | 1 ml | 1 ml |
| 4. | Beeswax | 3 g | 3.5 g | 3.2 g |
| 5. | Liquid paraffin | 10 ml | 15 ml | 12 ml |
| 6. | Borax | 0.2 g | 0.4 g | 0.3 g |
| 7. | Methylparaben | 0.02 g | 0.04 g | 0.03 g |
| 8. | Distilled Water | Q. S | Q. S | Q. S |
| 9. | Rose oil | Q. S | Q. S | Q. S |

Evaluation of cream:

Physical evaluation:

In this test, the cream was observed for colour, odour, texture, state (table 2)

Irritancy:

Mark the area (1 cm²) on the left-hand dorsal surface. Then the cream was applied to that area and the time was noted. Then it is checked for irritancy, erythema, and endemic any for an interval up to 24 h and reported (table 3).

Wash ability

A small amount of cream was applied on the hand and it is then washed with tap water.

pH

0.5 g cream was taken and dispersed in 50 ml distilled water and then P^H was measured by using digital P^H meter.

Viscosity

Viscosity of cream was done by using Brooke field viscometer at a temperature of 25 °C using spindle No. 63 at 2.5 RPM.

Phase separation

Prepared cream was kept in a closed container at a temperature of 25-100 °C away from light. Then phase separation was checked for 24 h for 30 d. Any change in the phase separation was observed/checked.

Spread ability

The spread ability was expressed in terms of time in seconds taken by two slides to slip off from the cream, placed in between the slides, under certain load. Lesser the time taken for separation of the two slides better the spread ability. Two sets of glass slides of standard dimension were taken. Then one slide of suitable dimension was taken and the cream formulation was placed on that slide. Then other slide was placed on the top of the formulation. Then a weight or certain load was placed on the upper slide so that the cream between the two slides was pressed uniformly to form a thin layer. Then the weight was removed and excess of formulation adhering to the slides was scrapped off. The upper slide

was allowed to slip off freely by the force of weight tied to it. The time taken by the upper slide to slip off was noted. (table 8)

$$\text{Spread ability} = m \times l/t$$

Where,

m= Standard weight which is tied to or placed over the upper slide (30g)

l= length of a glass slide (5 cm)

t= time taken in seconds.

Greasiness

Here the cream was applied on the skin surface in the form of smear and checked if the smear was oily or grease-like.

RESULTS AND DISCUSSION

Evaluation results of all the 3 formulations are gives below.

Physical evaluation

In this test color, odor, texture and state of the three formulations were checked.

Irritancy

Mark the area (1 cm²) on left hand dorsal surface. Then the cream was applied to that area and the time was noted. Then it is checked for irritancy, erythema, and edema if any for an interval up to 24 h and reported. According to the results all the three formulations that is F1H, F2H and F3H showed no sign of irritancy, erythema and edema.

Table 2: In this test color, odor, texture and state of the three formulations was checked

| S. No. | Parameters | Formulation F1H | Formulation F2H | Formulation F3H |
|---------------|-------------------|----------------------------|----------------------------|----------------------------|
| 1. | Color | Pale white | Pale white | Pale white |
| 2. | Odor | Pleasant | Pleasant | Pleasant |
| 3. | Texture | Smooth | Smooth | Smooth |
| 4. | State | Semisolid | Semisolid | Semisolid |



Table 3: Irritancy study observations

| S.NO. | Formulation | Irritant effect | Erythema | Edema |
|-------|-------------|-----------------|----------|-------|
| 1. | F1H | Nil | Nil | Nil |
| 2. | F2H | Nil | Nil | Nil |
| 3. | F3H | Nil | Nil | Nil |

Washability

Washability test was carried out by applying a small amount of cream on the hand and then washing it with tap water. All three formulations were easily washable.

pH

According to the results, the P^H of all the three formulations that is F1H, F2H and F3H were found to be nearer to skin P^H so it can be safely used on the skin.

Table 4: Washability observations

| S. No. | Formulation | Washability |
|--------|-------------|-----------------|
| 1. | F1H | Easily Washable |
| 2. | F2H | Easily Washable |
| 3. | F3H | Easily Washable |

Table 5: pH observation table

| S. No. | Formulation | pH |
|--------|-------------|-----|
| 1. | F1H | 6.7 |
| 2. | F2H | 6.2 |
| 3. | F3H | 6.6 |

Viscosity

Viscosity of cream was done by using Brooke field viscometer at a temperature of 25 °C using spindle No. 63 at 2.5 RPM. According to the results all the three formulations showed adequate viscosity.



Phase separation

Prepared cream was kept in a closed container at a temperature of 25-100 °C away from light. Then phase separation was checked for 24 h for 30 d. Any change in the phase separation was observed/checked. According to the results no phase separation was observed in all the three formulations.

Spreadability

The spread ability of the three formulations that is F1H, F2H, and F3H was carried out and out of that for F2H the time taken by the 2 slides to separate is less so as said in the

description of evaluation test lesser the time taken for separation of the two slides better the spreadability so according to this statement F2H showed better spreadability.



Greasiness

Here the cream was applied on the skin surface in the form of smear and checked if the smear was oily or grease-like. According to the results, we can say that all three formulations were non-greasy.

Table 6: Viscosity observation table

| S. No. | Formulation | Viscosity(Cps) |
|--------|-------------|----------------|
| 1. | F1H | 21020 |
| 2. | F2H | 11810 |
| 3. | F3H | 18820 |

Table 7: Phase separation observation table

| S. No. | Formulation | Phase separation |
|--------|-------------|---------------------|
| 1. | F1H | No phase separation |
| 2. | F2H | No phase separation |
| 3. | F3H | No phase separation |

Table 8: Spreadability observation table

| S. No. | Formulation | Time(sec) | Spread ability (g×cm/sec) |
|--------|-------------|-----------|---------------------------|
| 1. | F1H | 10 | 22.8 |
| 2. | F2H | 7 | 32.4 |
| 3. | F3H | 15 | 15.18 |

Table 9: Greasiness observation table

| S. No. | Formulation | Greasiness |
|--------|-------------|------------|
| 1. | F1H | Non-greasy |
| 2. | F2H | Non-greasy |
| 3. | F3H | Non-greasy |

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