

Anti acne face gel

PROJECT REPORT
FORMULATION AND EVALUATION OF
ANTI ACNE GEL

Submitted to
ATMIYA UNIVERSITY
School of pharmaceutical sciences



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8TH SEMESTER, B.Pharm.

Under the guidance of

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(2023-2024)

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16/04/2024

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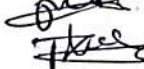
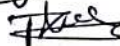
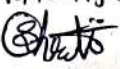
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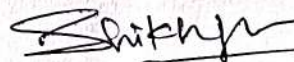
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DECLARATION

We, all hereby declare the Work is presented in the project report entitled Formulation And Evaluation Of Anti Acne Gel

It is an authentic record of work carried out by us during the studying period of semester 8 at and under the guidance of Atmiya University, Rajkot, and is being submitted for partial fulfillment of the requirement for the award of a bachelor's degree in B.pharm. This is not submitted anywhere else for the award of any other degree/diploma.

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Title Formulation And Evaluation Of Anti Acne Gel

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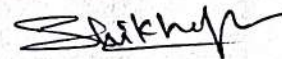
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

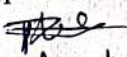
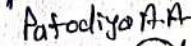

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Abstract

Acne is the common disorder occurring due to the changes in the hormones such as androgens, corticosteroids. It is mainly caused by the oil glands. Face and neck are the areas more prone to acne. Acne can be prevented by removing oil from the face. It can be achieved by proper cleaning of the face by pure water. Face wash prepared by herbal ingredients is better than synthetic ingredients to avoid side effects. Medicinal plants are used all over the world to treat various diseases due to its variety of phytochemical constituents .Phytoconstituents present in extracts of aloe vera , turmeric and moringa have antioxidant and anti-inflammatory properties. The present work was intended to prepare a gel with antioxidant, antibacterial and antiseptic properties which are necessary to keep the skin smooth and attractive. Gel was prepared and evaluated for its spreadability, viscosity, pH and the results were found to be satisfactory.

1. INTRODUCTION

The word "akme," which in Greek means "peak or apex," is used to refer to acquired or gemnetic diseases of the pilosebaceous units, which is what acne is. Acne vulgaris is the proper name for this kind of problem.(1). Changes in pilosebaceous units are the cause of the skin condition known as acne vulgaris. Affecting around 33% of individuals between the ages of fifteen to forty-four, it is prevalent during adolescence and has the potential to persist into adulthood. It is commonly regarded as a straightforward, self-limiting condition that affects adolescents. Many medical professionals and the majority of lay people think that treating acne is only necessary in severe cases.38. Acne is primarily caused by skin epithelial cells' over-expression of inflammatory signalling, which causes excessive sebum production and hyperproliferation, or hype keratosis, of the infra infundibulum of the sebaceous follicles (2). Pimples, blackheads, and cysts are the main symptoms of acne, which mostly affects the face, chest, and back because these regions have a high concentration of oil glands. It may manifest as inflammatory papules, pustules, nodules, cysts, or distinctive lesions that might cause pigmentary changes and scarring. (3).

A thorough history and physical examination can assist identify any underlying medical conditions that may be causing the acne. Stress, hormones, genetics, and excessive perspiration are all known to affect the development and/or severity of acne.(4) Acne outbreaks can be triggered by corticosteroids, oral contraceptives, iodides, bromides, lithium, and chemicals like dioxins. Endocrine diseases including Cushing's syndrome and polycystic ovarian syndrome can also cause acne eruptions. (5) overexposure to sunshine. the use of occlusive clothing, including headbands, backpacks, shoulder padding, and underwire bras. oil-based makeup and massages for the face. hormonal imbalances, including pregnancy. It appears that edema of the pilosebaceous duct is followed by a premenstrual acne flare-up. 70% of patients who are female experience this. The amount of branched fatty acids in sebum is mostly determined by genetic factors; estimates of heritability range from 50% to 90%. repeated mechanical injury brought on by washing the afflicted area with soap and detergent. (6) over exposure to sunshine. the use of occlusive clothing, including headbands, backpacks, shoulder padding, and underwire bras. oil-based makeup and massages for the face. hormonal imbalances, including pregnancy. It appears that edema of the pilosebaceous duct

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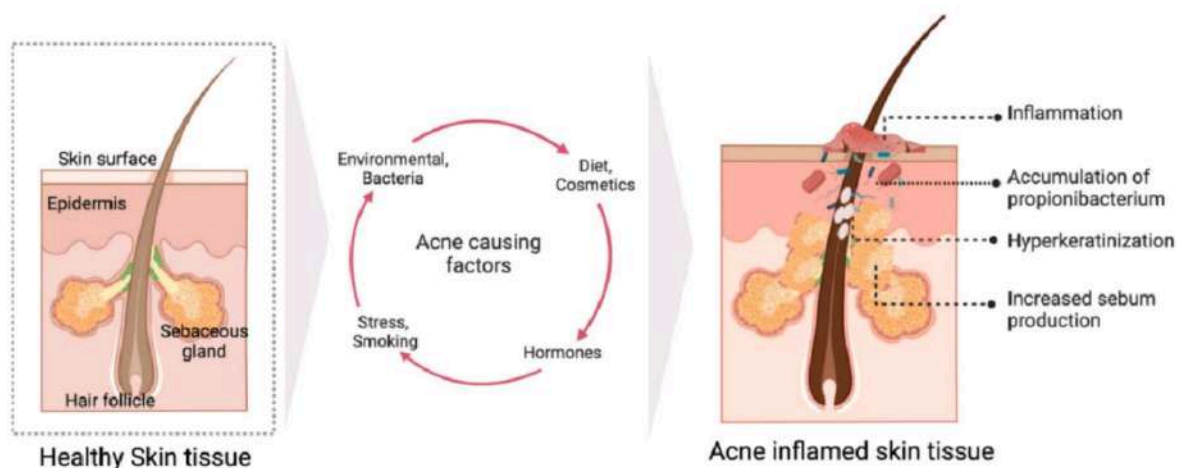


Fig.1 : Diagram showing the differences between skin tissue that is healthy or normal and skin tissue that is irritated by acne, along with the several elements that affect acne development.(40)

1.1 Types of acne

Blackheads: Developed on the skin as a result of dead skin cells and excess oil clogging hair shafts, blackheads are non-inflammatory acne lesions. The term "open comedo" refers to a blackhead because the skin's surface is still visible and appears dark, like black or brown. Mild acne known as "blackheads" typically affects the face, arms, chest, neck, back, and shoulders.

Whiteheads: When oil, germs, and skin cells clog the pores of hair follicles, tiny pimples known as whiteheads—a non-inflammatory form of acne—appear on the skin. Because the bumps on a whitehead are closed and white, they are known as closed comedones. Although whiteheads can appear anywhere on the body, the nose, chin, and forehead are the Tzone where they are most common.

Papules: Inflammation, which manifests as swelling, heat, redness, and discomfort, is the body's reaction to germs, excessive oil production, and increased androgen activity. Referred to as papules, these inflammatory lesions are thought to represent a transitional stage between non-inflammatory and inflammatory lesions. Papules appear as a tiny, pink lump on the skin that is usually less than 5 mm in diameter and free of pus.

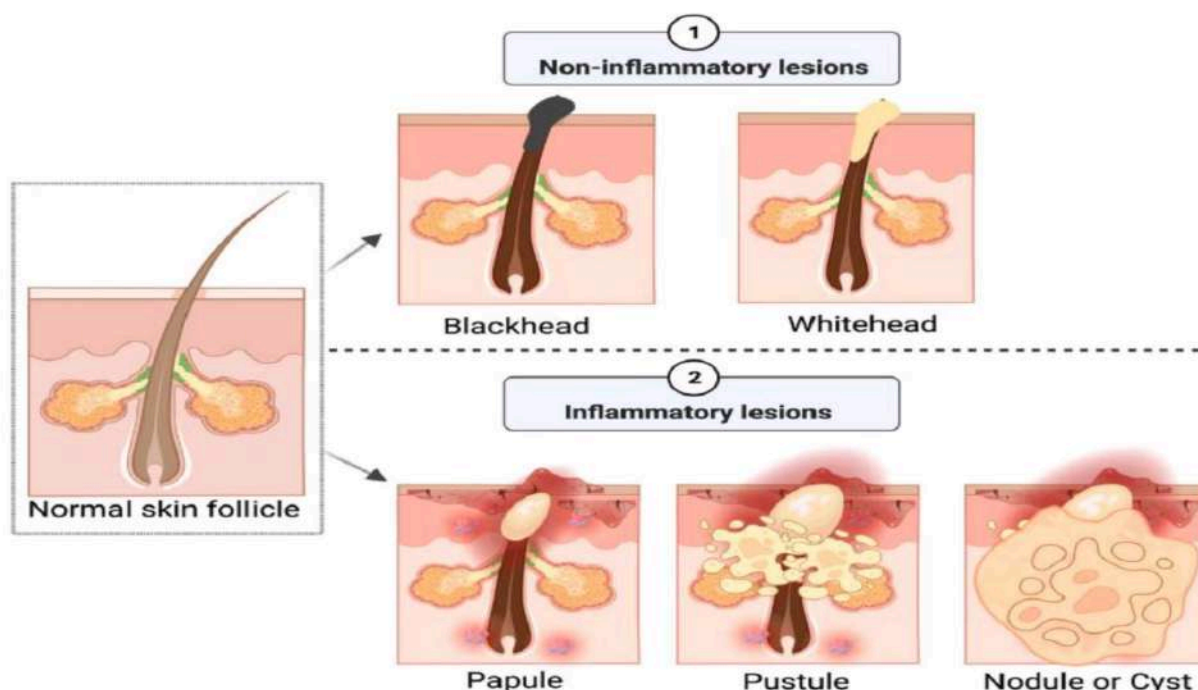


Fig.2 Diagrammatic representation of the key differences between the two types of lesions (inflammatory and non-inflammatory) and the pathogens that cause them.(40)

Pustules: Pustules are inflammatory lesions that resemble little lumps on the skin that are caused by dead skin cells and excess oil obstructing pores. Inflammatory lesions with pus or fluid in the center are called pustules. They frequently appear as white pimples encircled by red, inflamed skin. Although they can appear anywhere on the body, pustules are most commonly found on the hairline, shoulders, chest, back, face, neck, underarms, and pubic area.

Nodules: When bacteria, excess oil, and dead skin cells clog pores, severe inflammatory acne known as acne nodules arises. Infections that damage the pores beneath the skin's surface can also produce redness, swelling, and the appearance of a small bump in the surrounding area. Typically, this combination

results in comedones or whiteheads. Over-the-counter drugs alone cannot treat acne nodules, which can persist for weeks or months. Similar to papule acne, nodular acne has a diameter more than 5–10 mm and frequently appears on the chin or jawline of the face.

Cysts: As a result of clogged pores brought on by a buildup of bacteria, dry skin cells, and oil, cystic acne is a severe form of inflammatory acne that occurs beneath the skin (see Fig. 2). The majority of those affected are people of various ages with oily skin. A cyst usually manifests as huge, painful, white or red lesions that are filled with pus and can occasionally leave scars. Although cystic acne can form anywhere on the body, the face, arms, shoulders, back, chest, and neck are the most common areas. The majority of cystic acne sufferers have both inflammatory and non-inflammatory acne manifestations. (7)

Antibiotics (including tetracyclines, doxycycline & minocycline, macrolides, erythromycin, and clindamycin), benzoyl peroxide, retinoids, azelaic acid, and hormonal therapies (such as a combination of spironolactone and flutamide) are common anti-acne medications. (8) But given the growing use of antibiotics and their negative side effects, attention must be directed toward the investigation of herbal remedies. Due to the plant's safety and low risk of side effects, interest in using it as a medicine has gradually grown in recent years. (9).

The study's goal was to create a polyherbal gel using excipients that included aloe vera, turmeric, and moringa. Aloe vera is used to hydrate and revitalize the skin. It also acts as a shield against radiation-induced skin damage. (10) Because of its antibacterial qualities, turmeric may be able to help fight microorganisms that cause acne. It is a useful natural treatment for skin that is prone to acne because it also aids in lowering inflammation linked to acne. (11)The "miracle tree," Moringa, is becoming more and more well-liked in skincare products because of its abundance of nutrients, which includes vitamins A, C, and E, antioxidants, and important fatty acids.(12)

1.2 Types of gel

Gels are categorized primarily using two techniques based on:
1) (a) The colloid phase's nature: Two-phase inorganic gels and
(b) single-phase organic gels

- 2) Based on the nature of solvent:
 - (a) Hydrogel (Aqueous gels)
 - (b) Xerogel (13)

- 3) Based on rheological properties Usually gels exhibit non-Newtonian flow properties. They are classified into:
 - (a) Plastic gels
 - (b) Pseudo plastic gels
 - (c) Thixotropic gels

- 4) Based on physical nature:
 - (a) Elastic gel b rigid gel (14)

1.3 Advantages of gel:

- (1) Avoidance of first pass metabolism.
- (2) Convenient and easy to apply.
- (3) Improving physiological and pharmacological response.
- (4) Improve patient compliance.
- (5) Provide suitability for self-medication.

1.4 Disadvantage of gel:

- (1) Skin irritation of contact dermatitis may occur due to the drug and/or excipients.
- (2) Poor permeability of some drugs through the skin.
- (3) Possibility of allergic reactions.

1.5 Uses :

Using an anti-acne face gel formulated with moringa, aloe Vera, turmeric, and additional beneficial ingredients offers a range of advantages for achieving clearer, healthier skin. Here's a summary of the benefits:

Acne Control: The combination of salicylic acid, turmeric, and moringa helps to combat acne by unclogging pores, reducing inflammation, and inhibiting the growth of acne-causing bacteria. This targeted approach helps to minimize breakouts and prevent new blemishes from forming.

Anti acne face gel

Anti-inflammatory Properties: Aloe vera and turmeric are known for their potent anti-inflammatory effects, which soothe irritated skin, reduce redness, and promote healing. This helps to alleviate the discomfort associated with acne and promotes a calmer complexion.


Antioxidant Protection: Moringa is rich in antioxidants like vitamins A, C, and E, which help to protect the skin from environmental damage and oxidative stress. This antioxidant protection aids in repairing damaged skin cells and promoting overall skin health.

Moisture Balance: Glycerine and aloe Vera act as humectants, attracting and retaining moisture in the skin. This helps to hydrate the skin without clogging pores, maintaining a healthy moisture balance and preventing dryness and flakiness.

Brightening Effect: Turmeric has natural brightening properties that help to even out skin tone and fade acne scars and hyper pigmentation. This results in a more radiant complexion with reduced discoloration and improved overall appearance.

Multi-functional: In addition to targeting acne, the face gel also provides multiple skincare benefits, including hydration, antioxidant protection, and exfoliation. This multi-functional approach helps to simplify skincare routines and address multiple concerns with one product.

2. Marketing gel e.g. available

Sr.no	Uses	Brand name of product	Content	Product
1.	Reduce acne and scars , Anti inflammatory	Kazima	Aloe vera Turmeric Roes	

Anti acne face gel

2.	Reduce pimples, Treat scars, Lightens dark spots, Anti microbial	Herbodaya	aloe vera neem	
3.	Tan remover, Anti ageing, Stretch mark lightener, Moisturising, Anti acne	Daivik	moringa aloe vera tea tree oil	
4.	Fights acne prevents scarring Lightens acne spots moisture to skin brightens the skin delay signs of ageing & prevent sunburns	Mantra	Cucumber Turmeric Alovera	

Table : 1 Example of Marketing gel

REVIEW OF LITERATURE

3.1 Turmeric :

Curcuma longa L., or turmeric, is a perennial rhizomatous herb that can reach a height of one meter. It is the most widely used plant in the Zingiberaceae family and genus Curcuma. The genus has over 100 species, about 40 of which are native

to India.(15 , 16). The Arabic term "Kourkoum," which implies saffron, is the source of the Latin name "Curcuma."

It needs a lot of water and grows best in hot, humid climates. Its big, oblong leaves are paired with a short pseudostem. There is a main, or mother, rhizome and several branching minor rhizomes within the subterranean rhizome. They are pale yellow, reddish yellow, or orange brown in colour and are pyriform, ovate, or oblong in shape. It does not bear fruit, although it does have pale yellow flowers. It is grown in Africa as well as other tropical places including China, India, Indonesia, and Thailand.(17 , 18, 19) .



Fig. 3 Root of turmeric

Curcumin, the primary active component of turmeric, is responsible for the spice's distinctive yellow colour as well as its anti-inflammatory and antioxidant qualities. (19) Alkaloid chemicals, flavonoids, tannins, curcumin, and essential oils are present in the rhizome of turmeric. (20) ". an effective anti-inflammatory and antioxidant that can help prevent skin indications of aging. Turmeric contains potent antioxidants, antimicrobials, and anti-inflammatory curcumin active ingredients. Its combination of these qualities makes it a desirable option for use in cosmetics made especially to promote skin healing from wounds. According to studies, turmeric's curcumin can lessen the sebaceous glands' production of sebum, which lowers the risk of acne developing. In conclusion, turmeric rhizome extract may be used in cosmetics to promote wound healing, antiaging, and anti-acne properties.(21, 22).

3.2 Aloe vera:

The tropical cactus belonging to the aloe genus is the source of aloe vera. The Arabic word "Alloeh," which means "shining bitter substance," and the Latin word "vera," which means "true," are the sources of the name Aloe Vera (23,24). Aloe barbadensis miller is the plant used to make aloe vera. It's a perennial, xerophytic, succulent, shrubby or arborescent plant that belongs to the Asphodelaceae (Liliaceae) family. Its colour is pea-green. The aloe plant has long, thick, triangular leaves with edges tipped with spikes that can grow up to 20 inches long and 5 inches wide. The clear fresh parenchymal gel found in the leaf center is occasionally dried to make aloe vera concentrate or diluted with water to make goods containing aloe juice.(25).

Aloe comes in more than 300 species, the majority of which are indigenous to Arabia, Madagascar, and South Africa (20). The amounts of active substances in the various species vary slightly (26). One of the first known therapeutic plants for good skin is aloe vera. Since the first century AD, this plant has been frequently mentioned in herbal remedies (27).



Fig.4 Aloe vera

Because aloe vera contains vitamins, minerals, and hormones, it is highly helpful in treating acne and inflammation on any part of the skin. Because of its hydrophilic nature, it works wonders for oily skin (28). It helps the skin retain moisture better and eliminates dead skin cells that create collagen and elastin fibres, which makes the skin less wrinkly and more elastic, reversing the effects of aging on the skin. Through the action of amino acids and its cohesive effect on superficially peeling epidermal cells, it softens the skin. (29)

3.3 Moringa oleifera

Among the monogeneric family Moringaceae, *Moringa oleifera* Lam (syn. *M. ptreygosperma* Gaertn.) is one of the most well-known, widely distributed, and naturally occurring species (29). *M. oleifera* is a veritable treasure trove of vital minerals and antioxidants. Minerals including calcium, potassium, zinc, magnesium, iron, and copper are abundant in *M. oleifera* leaves. *M. oleifera* also contains vitamins, such as beta-carotene of vitamin A, vitamin B (folic acid, pyridoxine, and nicotinic acid), and vitamins C, D, and E. tannins, sterols, terpenoids, flavonoids, saponins, anthraquinones, and alkaloids are examples of phytochemicals.(30). It functions well as a phenolic, ascorbic acid, and carotenoids It has also long been recognized for its excellent cosmetic qualities; in fact, moringa has been found to be employed in many different health care products, such as conditioners and moisturizers for the body and hair, in recent years.(31)



Fig.5 *Moringa oleifera* tree

MO leaves and fruits are antioxidant-rich. Leaf extract demonstrated a concentration-dependent rise in glutathione and a fall in malondialdehyde; fruit extract demonstrated positive effects in removing free radicals; and root extract significantly and dose-dependently decreased iron and FeSO₄-induced microsomal lipid peroxidation. Antioxidant effects have been demonstrated to be contributed by triterpenoids, beta-carotene, campesterol, stigmasterol, β -sitosterol, avenasterol, monopalmitic and di-oleic triglycerides, and vitamin A. (32)

3.4 List of ingredient

Ingredient	Use/function
Carbopol 940	Gelling agent
Salicylic acid	Exfoliant
PEG 400	Solubilizer
Glycerine	Moisturiser
Triethanolamine	Neutralizer
Rose oil	Fragrance

Table : 2 list of ingredient

3.5 Preparation of turmeric extract:

- i) Making powdered turmeric After cleaning, 2 kg of turmeric rhizomes were cut into pieces and dried in the sun for three days. They were then baked at 600 C for three days. Next, the dried bulk was ground into a powder. Two kilograms of turmeric rhizomes yielded about 180g of powder, which was utilized for the maceration process.
- ii) Soxhlet extraction (ii) After sifting, approximately 170g of turmeric powder was placed in 550ml of distilled water in a dry, clean Soxhlet extractor. The extracted chemical was obtained by removing the solvent, usually using a rotary evaporator, following 96 hours of extraction. The solvent, which represented about 30% of the extracted material, was collected, while the insoluble part of the solid stayed in the thimble. Subsequently, the solvent was filtered multiple times until a clean and transparent filtrate was obtained.(37).



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Certificate of Analysis

(Representative Sample Certificate)

Turmeric (Haldi) Liquid Extract - Water Soluble

CERTIFICATE OF ANALYSIS (COA)	
PRODUCT NAME	Turmeric (Haldi) Liquid Extract - Water Soluble
LOT NO.	2143/2500
DATE OF ANALYSIS	18/11/2020
ANALYST	Dr. Anshu K. Sharma
LABORATORY	Pureenso Select, Jodhpur, India
TEST METHOD	As per Pharmacopoeia
TEST RESULT	Complies with the specified detail
REMARKS	
TESTED BY	Dr. Anshu K. Sharma
APPROVED BY	Dr. Anshu K. Sharma
DATE OF APPROVAL	18/11/2020
VALIDITY	18 Months
STORAGE	Store in a cool, dry place, away from direct sunlight.
REMARKS	

Fig. 6 turmeric extract and certificate

3.6 Preparation of aloe vera extract:

In the lab, the fresh leaves were cleaned and allowed to dry for two weeks under a paper towel covered in shade. Then, a mortar and pestle were used to homogenize them into a fine powder. After that, they were kept in airtight bottles and utilized in each extraction procedure. A mixture of 20 grams of powdered plant material and 100 millilitres of different solvents, including methanol, petroleum ether, distilled water, and chloroform, was combined. The plant extracts were collected and processed using a Soxhlet device before being kept in vials for additional research.(38)



ANALYTICAL REPORT

PRODUCT : ALOE VERA EXTRACT (Aloe barbadensis)
 FAMILY : ASPHODELACEAE
 BATCH NO : KV - NAL - 1/20
 DT OF MFG : NOVEMBER - 2020
 BEST BEFORE : 18 MONTHS
 LOT QTY : 2143/2500

TEST PARAMETER	STANDARD	RESULT
1. Appearance	Clear to Slight Yellow	Complies
2. Solubility in Water	Soluble	Soluble 100%
3. Odor	Characteristics	Characteristic
4. pH	3.0 - 8.0	6.82
5. Specific Gravity @ 25°C	1 to 1.1	1.077
6. Refractive Index @ 20°C	1.3 to 1.5	1.3924
7. Total Microbial Count	100 cfu / ml Max.	10 cfu / ml
8. E. Coli & Salmonella	Absent	Absent
9. Heavy Metals	10 PPM Max	Less Than 2 ppm

REMARKS: MATERIAL COMPLIES WITH THE SPECIFIED DETAIL.

PLEASE KEEP THE MATERIAL WITHIN 35 DEGREE CENTIGRATES AND AWAY FROM DIRECT SUN LIGHT.

Fig.7 aloe vera extract and certificate

3.7 Preparation of moringa oleifera extract:

After drying, the leaves were crushed. The powdered sample, 500 g, was then macerated with 2.5 L of 70% ethanol for 24 hours while being periodically shaken. Whatman No. 1 filter paper was used to filter the macerate, and the filtrate was then concentrated in vacuo at 40°C in a rotary evaporator. Until it was needed, the obtained crude extract was stored at 4°C in a refrigerator.(39)



PRODUCT : MORINGA EXTRACT (Moringa oleifera)
FAMILY : MORINGACEAE
BATCH NO : KV - MRGDIP - 1/21
DT OF MFG : NOVEMBER - 2021
BEST BEFORE : 18 MONTHS
LOT QTY : 12/100

TEST PARAMETER	STANDARD	RESULT
1 Appearance	Slight Yellow to Brown	Yellow
2 Odor	Characteristics	Characteristic
3 Solubility in Water	Soluble	Soluble 100%
4 pH	3.0 - 8.0	6.42
5 Specific Gravity @ 25°C	1 to 1.1	1.0206
6 Refractive Index @ 20°C	1.3 to 1.5	1.3732
7 Total Microbial Count	100 cfu / ml Max.	10 cfu / ml
8 E. Coli & Salmonella	Absent	Absent
9 Heavy Metals	10 PPM Max.	Less Than 2 PPM

REMARKS: MATERIAL COMPLIES WITH THE SPECIFIED DETAIL.

PLEASE KEEP THE MATERIAL WITHIN 35 DEGREE CENTIGRATES AND AWAY FROM DIRECT SUN LIGHT.

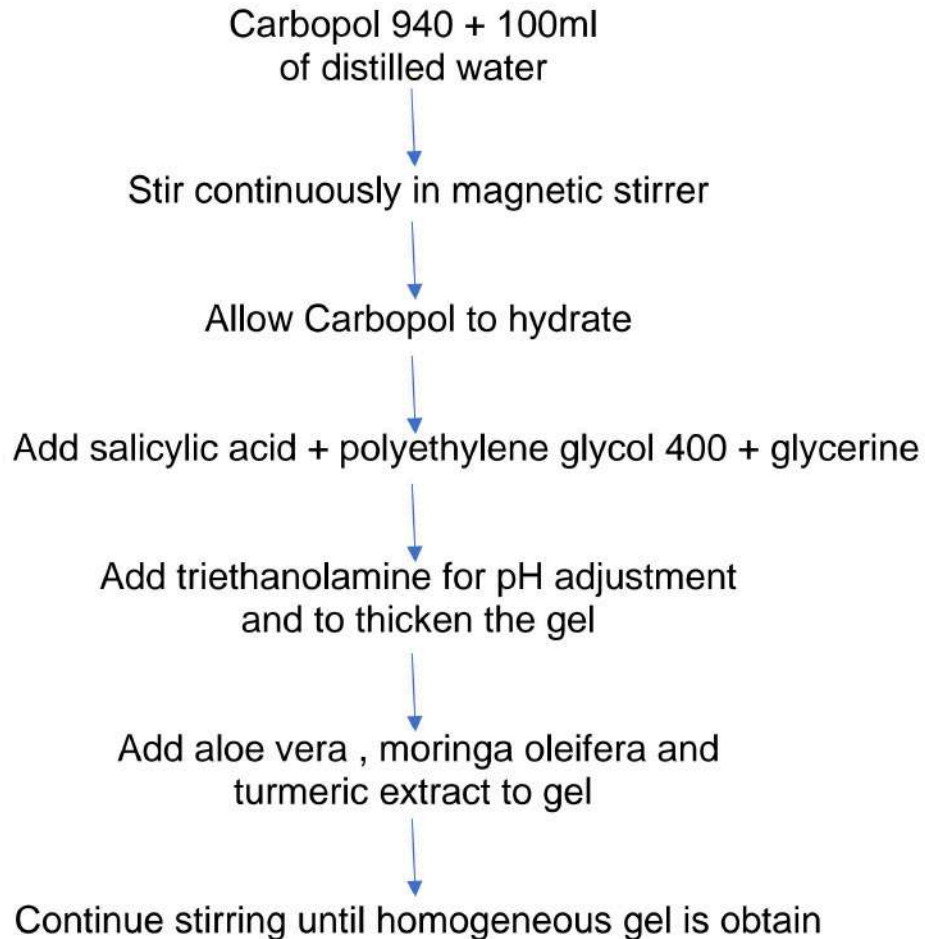
Fig.8 Moringa extract and certificate

3.8 Preparation of gel:

For the preparation of gel - Weigh out the required amount of Carbopol 940 and sprinkle it slowly into the measured water under continuous stirring using a magnetic stirrer. Allow the Carbopol to hydrate fully . In a separate container, dissolve the Salicylic acid in Polyethylene glycol 400 and a small portion of water to ensure even dispersion. Then add it to the Carbopol gel while stirring. Add the glycerine and to the mixture and continue stirring until fully dispersed. Slowly add the Triethanolamine to the gel while stirring continuously. This will neutralise the Carbopol and thicken the gel. Once the desired viscosity is achieved, add the extract of Aloe Vera, moringa oleifera and turmeric to the gel

and mix thoroughly. Continue stirring the mixture until all ingredients are uniformly distributed and a homogeneous gel is obtained.

Preparation of flow chart how to prepare gel formulation:



Anti acne face gel



Fig no . 9 formulation of gel

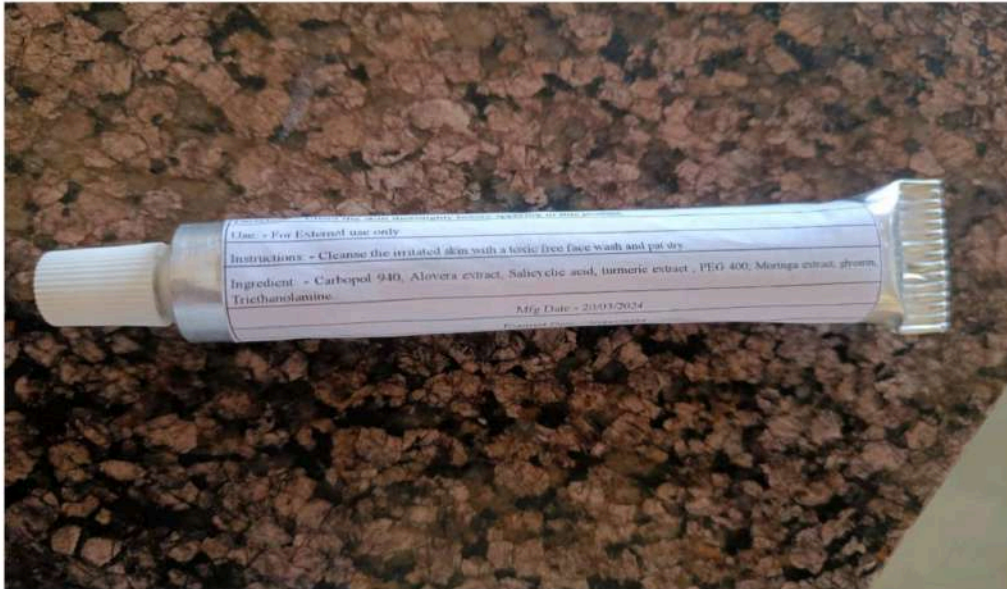


Fig .10 Final product

3.9 Formulation of anti acne gel.

Gel	Alovera	Turmeric	Moringa	Carbopol gel	PEG 400	Glycerine	Salicylic acid	Purified water
1	2.5	2.5	2.5	1	5	4	1	100
2	2.5	2.5	2.5	1	5	4	0.5	100
3	2.5	2.5	2.5	1.50	5	4	0.5	100
4	2.5	2.5	2.5	1.75	5	4	0.5	100
5	2.5	2.5	2.5	2	5	4	0.5	100

Table : 3 Formulation of gel

3.10 Evaluation study of Gels:

Physical Evaluation:

Physical parameters such as colour and appearance were checked.

Measurement of pH:

A digital pH meter was used to measure the pH of different gel compositions. After dissolving one gram of gel in 100 millilitres of distilled water, it was kept for two hours. Each formulation's pH was measured three times, and the average results were determined.[40]

Washability:

Washability Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

Spreadability:

The spreadability of the polyherbal dermal gel was ascertained by applying the principle of its slip-drag feature. According to protocol, 2 g of formulation had to

be placed on a ground slide, encircled by a corresponding glide slide with a hook attached. To create a consistent coating between the slides, a heavy object was pushed to them in order to release the trapped air. The edges were scraped clean of any extra gel. Using the following calculation, the top slide's time to travel 7.5 cm was calculated:

$$S = M \times L / T$$

where, M = weight tied to the upper slide (86 g);

L = length of glass slide (7.5 cm);

T = time taken (sec) to separate the glide slides from each other. [41]

Extrudability:

Measuring the force needed to extrude material from a tube is a common empirical test. The technique used to determine the applied shear in the rheographic zone that corresponds to a shear rate higher than the yield value and shows plug flow as a result [42]. The method used in this study to assess the extrudability of the gel formulation is based on the percentage of gel and gel extruded from a lacquered aluminium collapsible tube when the weight in grams needed to extrude at least a 0.5 cm ribbon of emulgel in 10 seconds is applied. Extrudability improves with increased extrusion quantity. Every formulation's extrudability is measured three times, and the average results are shown.

The extrudability is then calculated by using the following formula:

Extrudability : Applied weight to extrude emulgel from tube (in g) /Area (in cm²)

Viscosity:

The viscosity of the formulation was measured at 25±1°C using spindle no. 6 at 10 rpm and the Digital Brookfield Viscometer. A suitable wide mouth container was filled with an adequate amount of gel, allowing it to dip into the spindle and settle over a period of 30 minutes before to taking measurements. (43)

Antimicrobial Screening:

The disc diffusion method was used to investigate antimicrobial activity. The cultures were cultured for 24 hours at 37°C in a broth rich in nutrients. Following the incubation period. In sterile petri dishes, the culture containing sterile nutrient

broth was adjusted to 0.1. Then, 20 millilitres of melted Mueller-Hinton agar medium were added and let to harden. Discs (6 mm in diameter) impregnated with gel formulation were placed on the surface of the petri dishes that had been seeded with 0.1 ml of microbial suspension (5×10^5 CFU/ml). 30 minutes were spent with the plates at 100°C. The plates were incubated at room temperature for twenty-four hours at 37°C. Following the incubation time, the zone of inhibition was assessed (44).

Skin irritation test:

A semi-occlusive bandage was placed over the 6 cm² of normal hairless skin after 0.5 g of the prepared gel was applied, and the bandage was left on for an hour. Following the application period, the region was examined visually for any rashes or comparable signs, the bandage was taken off, and the applied gel was thoroughly scraped off. Seven days were dedicated to the test. Grades were used to express the outcomes. (45).

3.11 Result :

Physicochemical Parameters.

Gels	Colour	Clarity	pH	Spreadability (gm cm/t)	Extrudability (gm/cm ²)	Viscosity (cps)	Homogeneity
1	colourless	Translucent	7.08	86.7	85.6	40500	Homogeneous
2	colourless	Translucent	7.01	97	83.7	40700	Homogeneous
3	colourless	Translucent	6.68	108.4	90.5	43000	Homogeneous
4	colourless	Translucent	6.50	126.7	95.6	44200	Homogeneous
5	colourless	Translucent	6.75	145.5	94.4	47000	Homogeneous

Table : 4 Physicochemical parameters of gel

Antibacterial Activity of Gel Formulations:

Antimicrobial activity against various microorganisms like *S. aureus*, *E. coli* and *Bacillus subtilis* bacteria was evaluated.



Fig .11 Anti-microbial activity

Skin Irritation Test:

All the gel formulations were found to be safe while being applied on the skin and there was no irritation or sensitivity to the skin.

4. Conclusion :

The formulation of a herbal anti-acne gel utilizing aloe vera, moringa, and turmeric extract demonstrates promising potential in combating acne due to the combined properties of these natural ingredients.

Aloe vera contributes soothing and moisturizing effects, helping to alleviate inflammation and redness associated with acne. Additionally, it aids in the healing process of acne lesions, promoting faster recovery and reducing the risk of scarring.

Moringa, rich in antioxidants and antimicrobial compounds, offers anti-inflammatory and antibacterial properties. It helps to combat acne-causing bacteria while also reducing excess oil production, a common factor in acne development.

Turmeric extract, renowned for its anti-inflammatory and antimicrobial properties, further enhances the efficacy of the gel in fighting acne. Its active compound, curcumin, helps to reduce inflammation, redness, and swelling associated with acne lesions, while also inhibiting the growth of acne-causing bacteria.

It was concluded that the present research might hopefully bring advancement in the treatment of acnes using herbs as well as in developing poly herbal formulations for safe and effective management of diseases.

5. Label:

Anti Acne Face gel
Direction: - Clean the skin thoroughly before applying in this product.
Use: - For External use only
Instructions: - Cleanse the irritated skin with a toxic free face wash and pat dry.
Ingredient: - Carbopol 940, Alovera extract, Salicylic acid, turmeric extract , PEG 400, Moringa extract, glycerine, Triethanolamine.
Mfg. Date:- 20/03/2024
Expired Date:- 20/06/2024
Batch No: 1
Prepare By: 200541044,200501046,200501027,200501051,200501034
Atmiya University - Rajkot

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