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Formulation and Evaluation of Polyherbal Gel for Treatment of Acne

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Abstract: *Acne vulgaris is a persistent inflammatory skin condition that affects roughly 80% of adolescent girls during puberty. Antibiotics are being used more frequently to combat this problem, which has resulted in a number of negative side effects. As a result, it must concentrate on the herbal formulation as a first-line topical treatment. In this investigation, three medicinal plants with substantial antibacterial activity, Citrus limon, Curcuma longa, and Aloe barbadensis, were chosen to construct a polyherbal gel for the treatment of acne vulgaris. Citrus limon, Curcuma longa, and Aloe barbadensis were extracted and described.The topical gels were made with varied concentrations of orange peel extract, aloevera extract, and turmeric extract. The gel was made and assessed after being maintained at room temperature for 24 hours. Skin illness is caused by toxins collecting in the bloodstream as a result of blood impurities, poor eating habits, and a sedentary lifestyle. Acne vulgaris is a skin condition that affects the majority of teenagers during puberty due to hormonal changes that alter pathophysiologic variables. This formulation has the advantage of being convenient and straightforward to use, as well as improving physiological and pharmacological responses. As a result, we discovered that the Anti-acne gel has good properties in this study.*

Keywords: Anti-acne gel, herbal formulation, and evaluation

I. INTRODUCTION

Acne vulgaris, also known as acne, is a persistent skin disorder caused by excessive sebaceous gland production in the follicles. Acne's pathological aspect begins when aberrant sebaceous therapies for acne treatment have a lot of side effects caused by chemical compounds in cosmetic items, which usually result in skin irritation and bacterial resistance issues. Many recent studies have shown that natural active substances produced from plants and animals, such as proteins or peptides, have anti-acne capabilities while being low in toxicity to humans.

Acne is one of the most socially distressing skin conditions, especially for teenagers, who must deal with a disfiguring disease that strikes at a time when their sexual maturation makes them most conscious of their appearance.[3] Furthermore, chronic scarring of the skin caused by severe acne causes social misery throughout adulthood. Acne is characterised by aberrant keratinocyte growth and desquamation, which leads to ductal blockage. The multiplication of P. acne is aided by androgen-stimulated sebum production. Excessive sebum production clogged the pores, causing irritation. Antibiotics have been known to be effective against vulgaris for many years.

Acne is the most common skin illness among the various skin problems. Almost everyone has had acne-prone skin at some point in their lives, especially as a teenager. Although acne is not considered a hazardous disease, almost all acne sufferers experience a change in look, which can lead to a loss of confidence and interfere with everyday activities.

Skin illness is caused by toxins collecting in the bloodstream as a result of blood impurities, poor eating habits, and a sedentary lifestyle. Acne vulgaris is a skin condition that affects the majority of teenagers during puberty due to hormonal changes that alter pathophysiologic variables. Gram-positive bacteria, such as Staphylococcus and Escherichia species, have been associated to acne. Acne vulgaris usually affects parts of the skin that have a lot of sebaceous follicles, like the face, upper chest, and back. Acne vulgaris symptoms include discomfort, tenderness, and erythema.

With the rising use of antibiotics and their associated adverse effects, it's more important than ever to focus on herbal medicine research. Because of its apparent safety and low risk of side effects, there has been a gradual increase in interest in using the medicinal plant in recent years. Due to diverse classes of phytoconstituents, several Indian medicinal plants have been approved with various pharmacological properties.

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HERBAL MEDICINE

World health organization defines traditional herbal medicinal products as homegrown medicinal products or plant-derived substances the herbal drug industry in India is probably the oldest medical care system in the world.

Herbal healing has been described in ancient texts, including the Vedas and early religious works. It is most likely the world's oldest medical care system. Herbal healing is the practise of using herbs, herbs extracts, or natural items to improve one's health. Herbal products are more acceptable due to the notion that they are safe, have many therapeutic capabilities, and have no or few adverse effects when compared to modern chemical entities. The number of patients seeking alternative and herbal treatments is rapidly increasing Herbal remedies are the culmination of hundreds of years of therapeutic experience from generations ofdrugshave been linked to serious side effects. The employment of a scientific technical method in traditional medicine has been used to attain the goals in this study. Because it is immediately administered to the afflicted spot, topical gel formulations are more suited than oral drug administration. Because there is no liver biotransformation, the formulation must cross the epidermal barrier to provide the intended therapeutic effect. indigenous medicine practitioners Herbal medications are in high demand for basic health care in the poor countries, not only because they are less expensive, but also because they are more culturally acceptable, have greater compatibility with the human body, and have less adverse effects. Recent discoveries, however, suggest that not all herbal treatments are safe, as certain herbal.

TOPICAL DRUG DELIVERY SYSTEM

The goal of any drug delivery system is to deliver a therapeutic amount of drug to the right region in the body in order to attain and then maintain the desired drug concentrations quickly. The skin, which is one of the most easily accessible organs on the human body for topical administration, is the primary route of topical medicine delivery. The application of a drug-containing formulation to the skin to treat cutaneous disorders (eg. acne) or cutaneous symptoms of a general disease (e.g. psoriasis) with the goal of limiting the drug's pharmacological or other action to the skin's surface or within the skin is referred to as topical delivery.

The skin is the body's biggest organ. The epidermis, dermis, and dermis are the three primary histological layers of skin hypodermis, hypoderm (subcutaneous layer) Drug molecules come into touch with cellular waste, bacteria, and other things near the skin's surface, causing penetration. There are three routes for the therapeutic ingredient to reach live tissue through the follicles of the hair by way of sweat duct sand between the appendages across a continuous stratum corneum[7]

GEL FORMULATION

A gel is a two-component, cross linked three-dimensional network consisting of structural materials interspersed by an adequate but proportionally large amount of liquid to form an infinite rigid network structure which immobilizes the liquid continuous phase within The structural materials that form the gel network can be composed of inorganic particles or organic macromolecules, primarily polymers.

Advantages of Gel Formulation

- Compared to other semisolid dosage forms, gels are simple to make.
- A gel is a non-greasy, beautiful composition.

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- By entwining the polymer multiple times, it can be employed as a controlled release formulation.
- Gels have a high level of adhesion to the application location.They are biocompatible and biodegradable.
- Gels have a longer retention duration than other topical dose formulations.
- On the application location, they form a protective layer.

Disadvantages of Gel Formulation:-

- Gels have a slower and longer lasting effect.
- Irritation may be caused by the additives or gelators.
- In gels, the presence of water may enhance the risk of microbial or fungal attack.
- During storage, gels may experience syneresis (solvent expulsion from the gel matrix).
- Drying of the gel may occur as a result of solvent evaporation from the formulation.
- Some gels include covalent bonds that make them impenetrable, trapping the medicine inside the gel matrix.
- Some gels may become unstable due to flocculation.

II.MATERIALS & METHODS

Table 1 Materials & Excepient

Sr. No.	Materials & Excepient	Quantity	Properties
1.	Lemon peel powder	2gm	Antioxident & tanning property
2.	Aloe Vera Powder	2gm	Moisturizing property
3.	Curcumin extract	0.10gm	Antibacterial property
4.	Rose water	Q.S.	Soothes skin irritation
5.	Eucaluptus oil	4-5drops	For acne treatment
6.	Propylene glycol 400	0.2ml	Preserve moisture
7.	Carbapol 940	0.25mg	Gelling agent
8.	Methyl paraben	0.08mg	Preservative
9.	EDTA		Improve stability
10.	Triethanolamine	1.0ml	Adjust PH (6-7)

III. MATERIAL & ITS EXTRACTION METHODS

EXTRACTION OF CURCUMIN BY SOXHLET

1. Turmeric rhizomes were dried in an oven at 105°C for 3 hours. To obtain a homogenous powder with a particle size of 0.18 mm, dried rhizomes were triturated in a mortar and screened through a sieve with mesh 80.
2. To avoid moisture absorption, the turmeric powder was kept in the refrigerator.
3. As a reference procedure, the Soxhlet extraction was carried out as follows: 15 g ground turmeric powder was weighed and placed in the Soxhlet apparatus, which was gradually filled with acetone as the extraction solvent.
4. The extraction experiment was carried out at 60 °C within 8 h. Upon completion of the extraction, the acetone was separated from the extract using rotary evaporator. The evaporated extract is then evaluated & used for the formulation of anti acne gel

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Fig.1 Extraction of Curcumin by Soxhlet

EXTRACTION OF LEMON PEELS

Lemon juice peels were obtained from a manufacturer of lemon juice. The peels were then cleaned and dried completely in a 60°C oven for 72 hours. The dried peels were ground with a particle size range of 0.5 mm to 0.1 mm and socked in methanol with a mass to volume ratio of 1:25(g/mL) for 72 hours using a mortar and pestle.It was then collected in glass Petri plates after being filtered with Whatman No. 1 filter paper. This entire extraction procedure was done 2-3 times, after which the obtained extracts were evaporated and dried at 37°C.

EXTRACTION OF ALOE VERA

Aloe Vera leaves collected from the local nursery. The leaves washed with water and rinds were removed .The inner gel scrapped and cut into pieces, solar-dried at 30-45o C for 3 weeks and dry gel particles were collected.

IV. PREFORMULATION STUDY OF CURCUMIN EXTRACT

Table 2 Preformulation study of curcumin extract

Test	Observation
Carbohydrates:- The extract was dissolved in 10ml of distilled water, filtered through filter paper, and the filtrate was tested for carbohydrates. **a)MolishTest**: A test tube was filled with 2ml of soln. One drop of Molish Reagent was added to the mixture. From the sidewalls of the test tube, 2ml of conc.HCL was added.	The presence of carbohydrates is indicated by the existence of a Voilet ring at the confluence of the two liquids.
Protein:- The extract was dissolved in 10ml of distilled water & filtered through filter paper & the filtrate is subjected to test for proteins. **a)Millons test:** To 2ml of filtrate few drops of Millon's reagent are added. The result was observed. **Alkaloid:-** 50mg solvent-free extract was mixed with 3ml dil. HCL and filtered completely. The filtrate was thoroughly examined using the	A white precipitate indicate presence of protein.

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following alkaloid reagents. **a) Mayer's test:** Add a few drops of Mayer's reagent to a 1ml filtrate by the side of the test tube.	White or creamy precipitate indicate presence of alkaloid.
Tannins:-To 0.5ml of the extract solution 1ml of water & 1-2 drop of FeCl soln was added.	Blue colour was observed for gallic tannins & green black for catecholic tannins

V. METHOD OF PREPARATION OF GEL CONTAINING EXTRACT

- The topical gel were prepared which comprised extract of lemon peel, aloe vera & turmeric with different concentrations.
- The gels were prepared by using carbapol 940, Propylene glycol 400, methylparaben, Propylparaben, EDTA.
- Rose water required for these formulation was divides into 2 parts in one part an accurate amount of extract were separately dissolved in 15ml of rose water to this calculated qyantity of propylene glycol 400 were added.
- In one part, carbapol 940 was dissolved in 35ml & to this solution of methylparaben, propylparaben &EDTA were added. both of these solution were mixed in beaker & triethanolamine was added dropwise.
- Then extract & prepared gel is mixed & stirred for 1/2 hour. The prepared gel is evaluated by organoleptic evaluation & physicochemical appearance.

VI. EVALUATION OF PREPARED GEL FORMULATION

Fig.2 Prepared Anti-acne gel

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The prepared gel formulation was evaluated for following parameter.

Organoleptic Evaluation:-

- Colour:-The Colour of the formulation was checked out against white background.
- Odour:- The odour of the gel was checked by mixing the gel in water & smelling it.
- Homogeneity:- The developed gel is tested for homogeneity by visual inspection after the gel have been set in thecontainer. They are tested for their appearance & presence of any aggregate.
- Greasiness:- The formulation was assessed by application on the skin.

Physicochemical Assessment

pH:-Within 24 hours of preparation, the pH was tested using a digital pH metre.

Fig.3 Determination of pH by digital pH meter

Spreading Ability

Two sets of standard-sized glass slides were taken. The polyherbal formulation gel was sandwiched between the two slides for a total length of 60mm. Removed the extra gel that had attached to the glass slides' surface and secured them to a stand without causing any disruption. A 20 g weight was linked to the top slide, and the time it took for the upper slide to move to a distance of 60mm under the influence of the weight was recorded.

Spreading Ability = (Weight × Length)/ Time

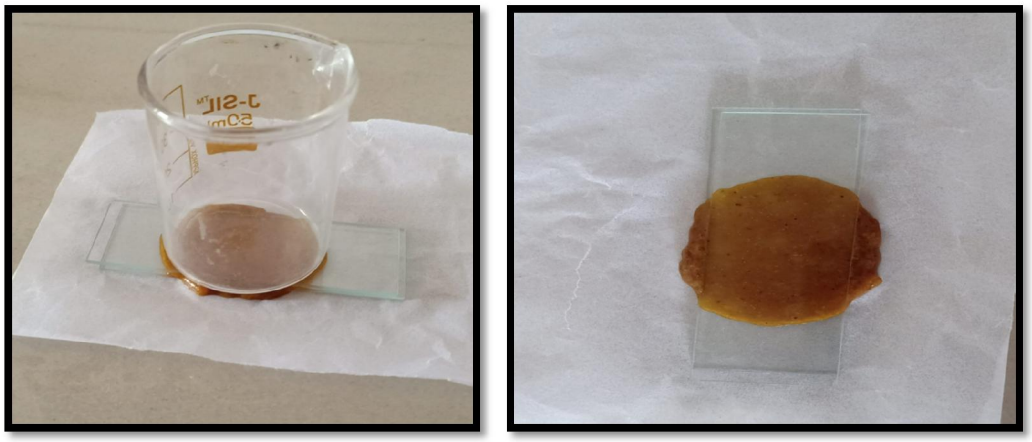

Fig.4 Spreading Ability Study

Stability Research

The prepared formulation's stability was tested by storing it at different temperatures for 15 days. The anti-acne gel composition was tested at room temperature and in the refrigerator (temperature-5.0)

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Biological Activity:-

Nutrient agar was used in a cup-plate agar diffusion method. In this process, Petri dishes of agar are created by pouring melted agar medium previously inoculated with specified microorganism. After the agar has solidified, borer cups are created, and the cups are filled with a solution of acceptable concentration of sample and standard, respectively, and inoculated at 37 °C for 1 hour.

Fig.5 Biological activity shows zone of inhibition

VI. RESULT & DISCUSSION

Preformulation Study

The result of primary phytochemical evaluation of turmeric rhizomes are listed in table 2.The result indicate that presence of Carbohydrates,Proteins, Alkaloids,Tannins.

Table 3 Preformulation study of curcumin extract

Sr. No.	Test	Observation
1.	Carbohydrates	Positive
2.	Proteins & Amino acid	Positive
3.	Alkaloids	Positive
4.	Tannins	Positive
5.	Saponins	Negative

Anti-acne gel for management of acne was prepared according to literature.

Organoleptic Evaluation

Polyherbal gel was evaluated for organoleptic parameters shown in table 3. The color of formulation was found to be reddish brown. The product was Characteristics. The homogeneity or texture of product was found to be soft and was acceptable as per requirements of cosmetics formulation.

Table 4 Organoleptic Evaluation

Types of evaluation	Parameter	Observation
Organoleptic Evaluation	✓ Colour	✓ Reddish brown
	✓ Odour	✓ Characteristics
	✓ Homogeneity/Texture	✓ Soft

Physicochemical Evaluation:

Polyherbal Anti-acne gel was evaluated for physicochemical parameters showed in table 4. pH of formulation was found near to neutral i.e. 6.8. this would not cause any irritation to skin. The ingredient of gel is rose water which promotes moist property. The spread ability of the formulation was also be evaluated by the physicochemical evaluation.

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Table 5 Physicochemical Evaluation

Types of evaluation	Parameter	Observation
Physicochemical Evaluation	✓ pH	✓ 6.8
Spread ability study	✓ Spread ability	Pass

Stability Study

The result of stability study were shown in table 5 The Appearance, color, odour, and texture of Anti-acne gel were found normal and good at room temperature and refrigerator condition.

Table 6 Stability study

Parameter	At room temperature	At refrigerator
Appearance	Normal	Normal
Colour	Normal	Normal
Odour	Normal	Normal
Texture	Normal	Normal

Biological Activity

In this approach, melted agar media is poured into Petri dishes that have already been inoculated with a particular microbe. After the agar has solidified, borer cups are created, and the cups are filled with a solution of appropriate concentrations of sample and standard, respectively, and inoculated at 37 °C for 24 hours. The antimicrobial chemicals spread through the agar around the cup, forming a distinct zone of inhibition of the bacterium sensitive to the sample, whose diameter can be quantified as given in table 6. The prepared polyherbal gel shows antibacterial activity against staphylococcus aureus with the zone of inhibition of 28mm.

Table 7 Biological Activity

Type of evaluation	Parameter	Observation
Microbial Evaluation	Antimicrobial activity	28mm

VII. CONCLUSION

The present study was aimed to developed polyherbal gels for anti-acne treatment using lemon peel powder, curcumin extract, aloe vera an aqueous based carbapol gel system and evaluated.

Recently herbal medicines are more considered as safe with fewer side effects than synthetic drug for the treatment of acne vulgaris. Therefore In the global market. Natural remedies including herbal formulation are in great demand. It is a very good attempt to formulate and evaluate the polyherbal anti-acne gel along with the stability studies. Based on this studies, polyherbal anti-acne gel prepared from the extract of Citrus sinensis, Aloe barbadensis and Curcuma longa.

The world market is also moving towards polyherbal medicines for health care, health & for cosmetics purpose including dermal preparations like anti-acne preparations. The use of herbal product has significantly increased over the past years. In the present study, an attempt was made to formulate polyherbal anti-acne gel using different natural ingredients like Lemon peel powder, curcumin, Aloe vera, Eucaluptus oil & to evaluated for physical parameters like colour,odor,Homogeneity,Spread ability,etc.These prepared formulation are having good spread ability & homogeneity result.

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CONFLICT OF INTEREST

The author declared no conflict of interest.

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REFERENCES

[1]. Ajinkya Mate, Padmashri Ade, Ajay Pise, Sachin More, Shilpa Pise, Rohini Kharwade Formulation and Evaluation of Polyherbal Gel for the Management of Acne.

[2]. Sanjoy kumar pal,Yogeshwer Shukla, A mini-review on Herbal Medicine: Current status & the future.

[3]. Sakthivel Lakshmana prabhu, Appavoo Umamaheshwari , Chandran Arun Kumar, Murugesan Banumuthupriya, A research article on Formulation and Evaluation of Polyherbal gel containing Natural Antimicrobial for the management of acne vulgaris.

[4]. Swarnali Roy, Sankhadip Bose, Dhrubhjyoti Sarkar,sipra Sarkar, Areview article on Formulation and Evaluation Anti-acne gel conaining Murraya Koenigi Extract.

[5]. Nguyen Phuoc Minh, Nguyen Thi Linh, Le Thanh, Quach Yen Loan A review on Technical factor affecting to extraction & drying of curcumin from turmeric(Curcuma longa).

[6]. Harshal Pawar, Mugdha Karde, Nilesh Mundle, Pravin Jadhav & Kavita Mehra, A research article on phytochemical Evaluation & Curcumin content determination of Turmeric Rhizomes collected from Bhandara District of Maharashtra.

[7]. Mr. Suraj kishan Ghodke, Mr. L.R. Bagwan, Dr. Hingne L.D. a international journal of creative research thoughts, Research of formulation and Evaluation of Anti-acne gel.

[8]. Supriya Agnihotri, sharad Wakode,Anoop Agnihotri,A reseaech article on formulation and evaluation of herbal antiacne gel of myrica esculenta.

[9]. https://en.m.wikipedia.org/wiki/Rose_water.

[10]. https://www.healthline.com/health/rose-water-for-acne

[11]. https://dermcollective.com/eucalyptus-oil-in-skin-care

[12]. Suva MA, Patel AM, Sharma N. A Brief Review on Acne Vulgaris : Pathogenesis, Diagnosis and Treatment. Res Rev J Pharmacol.

[13]. Prasad SB. Acne vulgaris: A review on pathophysiology and treatment.

[14]. Sinha P, Srivastava S, Mishra N, Yadav NP. New Perspectives on Antiacne Plant Drugs: Contribution to Modern Therapeutics.

[15]. Singh S. Extraction and characterization of Orange peel.

[16]. 16. Misal G, Dixit G, Gulkari V. Formulation and evaluation of herbal gel. Indian J Nat Prod Resour 2012;3(4):501–505.

[17]. Anamika Bagchi (2012). Extraction of curcumin. IOSR Journal of Environmental Science, Toxicology and Food Technology 1(3): 1-16.

[18]. Agarwal P, Tyagi N, Gaur P, Puri D and Shanmugam. "Poly herbal antiacne gel containing extracts of Mangifera indica and Syzygium cumini seeds: bioassay guide activity against Propionibacterium acne". Bio-interface Research in applied chemistry. 2019:9(4)-4177-4182.

[19]. Rasheed A, Reddy G, Mohanlakshmi S and Kumar C.K. "Formulation and comparative evaluation of poly herbal anti-acne face wash gels". Pharmaceutical Biology. 2011: 49 (8) 771-774.

[20]. Deivis de Moraes Carvalhd, Katiuchia Pereira Takeuchi, Robson Maia Geraldine, Celso José de Mdura, Maria Célia Lopes Tdrres (2016). Production, solubility and antioxidant activity of curcumin nanosuspension. Food Sci. Technol, Campinas 35(1): 115-119.

[21]. Eugenio Torres Rodríguez, Lic. Zonia Guillén González, Robinson Hermosilla Espinosa, Quirino Arias Cedeño, Christian Vogel, Manuel Almeida Saavedra (2014). Use of ultrasound in the extraction of curcumin from its natural source. Revista Cubana de Plantas Medicinales 19(1):14-20.

[22]. Yadav N, Singh A, Chatterjee A, Belemkar S. Evaluation of efficacy and safety of perfect face gel and perfect face tablets in management of acne. Journal of Clinical Experimental Dermatology Research 2011; 2: 118. doi:10.4172/2155-9554.1000118.

[23]. Aruna MS, Sravani A, Resshma V, Santhi Priya N, Surya Prabha M, Rama Rao N. Formulation and evaluation of herbal acne gel. World Journal of Pharmaceutical Research 2015; 4(5): 2324-2330.

[24]. Verma S, Singh SP. Current and future status of herbal medicines. Veterinary World 2006; 1: 347-350.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
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[25]. Kajal L. Jain, Pratim kumar Choudhary, Maya sharma, suresh dev a Research article on preparation & evaluation of anti-acne herbal gel.

[26]. Reference book of pharmacognosy by C.K. Kokate, A.P. Purohit, Nirali prakashan , 55th edition; Page no. 9.9

[27]. Reference book of pharmacognosy by C.K. Kokate, A.P. Purohit, Nirali prakashan , 55th edition; Page no. 14.138

[28]. https://images.app.goo.gl/PHtMxFbq8wJpxHf89