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INNOVATION AND EVALUATION OF A NOVEL HERBAL CREAM TARGETING BACTERIAL AND FUNGAL INFECTIONS

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ABSTRACT

Sulfur (Gandhak), turmeric (Haldi), and Piper longum (Gathi Pippli) are well-documented for their antibacterial and antifungal activities, and their applications in treating skin diseases. This study aimed to formulate and evaluate an herbal cream containing sulfur (Gandhak), turmeric (Haldi), Piper nigrum (Kali Mirch), and Piper longum (Gathi Pippli) for its antibacterial and antifungal properties. The efficacy of the cream was tested against two pathogens known to cause skin infections: *Candida albicans* and *Escherichia coli*. The study focused on developing a stable, effective herbal cream and assessing its physical properties, including spreadability, pH, viscosity, irritation potential, and washability. Additionally, the cream's antifungal properties were evaluated to determine its potential as a treatment for skin infections.

KEYWORDS: sulphur (Gandhak), Turmeric (Haldi), Piper nigrum (Kali Miri), Piper Longum (Gathi Pippli), Herbal cream.

1. INTRODUCTION[1,2,3,4]

Herbal therapy is an ancient tradition, with medicinal plants used for centuries to address a variety of health issues, including both infectious and non-infectious skin ailments. Sulfur (Gandhak) is a particularly important medicine, commonly used in numerous formulations for skin problems, including Gandhak Malahar. Classical Rasashastra literature describes Gandhak as krumighna (Antimicrobial), keetnashak (Insecticidal), and keetaghna (pest-repellent), highlighting its effectiveness in treating skin issues. Skin infections are commonly caused by *Escherichia coli* and *Candida albicans*.

The current study aimed to develop a safe and effective herbal cream with antifungal and antibacterial properties, and to assess its stability.

Experience the power of nature with our luxurious herbal cream, expertly crafted to nourish and rejuvenate your skin. This rich and velvety blend of carefully selected herbs and botanicals works in harmony to hydrate, soothe, and protect your complexion, leaving it soft, supple, and radiantly healthy. Harnessing the ancient wisdom of herbalism, our cream combines the finest natural ingredients to provide a truly holistic skincare experience. Treat your skin to the gentle yet potent benefits of our herbal cream and discover a more vibrant, resilient you.

Experience the transformative power of herbs with our luxurious cream, expertly formulated to harness the natural potency of botanicals. This rich and creamy blend of herbal extracts works synergistically to address a range of skin concerns, from dryness and irritation to fine lines and uneven tone. Our herbal cream is a true skincare haven, providing long-lasting hydration, soothing comfort, and visible renewal. Treat your skin to the gentle yet effective benefits of our herbal cream and discover a more even, radiant, and resilient complexion.

Herbal cream: - A cream is defined as a semisolid emulsion, which can be classified as either oil-in-water (o/w) or water-in-oil (w/o). These semisolid emulsions are intended for external application. Creams are categorized into oil-in-water and water-in-oil types. They are applied to the outer or superficial part of the skin, with the primary function of remaining effective at the site of application for an extended period. The purpose of a skin cream is to protect the skin from various environmental conditions, weather elements, and to provide a soothing effect.

There are different types of creams, including cleansing, cold, foundation, vanishing, night, massage, hand, and body creams. The main aim of our work is to develop a herbal cream that provides multiple benefits, such as moisturizing, reducing acne and skin irritation, alleviating skin diseases like eczema, psoriasis, and dry skin, minimizing wrinkles and rashes, and enhancing facial glow.[12,13]

Advantages

- Provides effective relief from fungal infection
- Helpful in treating mild skin

- It has anti- aging property
- It moisturizes the skin
- Topically applied to the skin to control and manage fungal infections
- It also provides coolness

Disadvantages

- **Variable efficacy:** Herbal ingredients can have varying levels of antifungal activity, and their effectiveness may not be as consistent as conventional antifungal medications
- **Skin irritation:** Some herbal ingredients can cause skin irritation, allergic reactions, or contact dermatitis sensitive individuals.
- **Interactions with medications:** Certain herbal ingredients can interact with prescription medications, such as blood thinners, diabetes medications, or immunosuppressants.
- **Lack of regulation:** Herbal products may not be regulated as strictly as conventional medications, which can lead to variations in quality, purity, and potency.
- **Delayed healing:** Relying solely on herbal antifungal creams might delay seeking medical attention for severe or persistent fungal infections, potentially leading to complications.

Objectives

- To prepare cream having antifungal properties.
- Antifungal cream having active pharmaceutical ingredient.
- Selecting herbs having antifungal properties.
- To improve the effect of antifungal cream on fungal infection.
- In order to reduce the side effect.

2. MATERIAL AND METHOD

Crude drugs from Plant collected from the local Market of Jamner Dist Jalgaon Maharashtra. Crude drugs are dried in sunlight and converted into powder form by reducing its size using mixer in department of pharmacognosy. Synthetic additives collected from pharmaceutics laboratory of SSJIPER Jamner.

Pharmacognosy of plant material method[5]

The collected material was dried firstly and then grind it into the mixer (bosch true mix pro) then we get the fine powder and the passed it into the sieved.

Common Name	Part Used	Family	Uses	Figure
Mesua ferrea Ceylon ironwood	Flower	Calophyllaceae	Used in itching, skin diseases, antifungal agent	
Piper Nigrum	Seeds	Piperaceae	Antimicrobial Anti inflammatory Antifungal	
Cyminum Carnimum	Seeds	Apiaceae	Esential oil in its disinfectant	
Copper Sulfate	Powder	Algaecides	Fungicide	
Sulphur	Powder	Brassicaceae	Used in Infection Antifungal	
Turmeric	Powder	Zingiberaceae	Antimicrobial Used in itching, ringworm	
Piper Longum	Bark	Piperaceae	Antifungal	
Potassium Alum	Powder	Mineral family Alunites	Antimicrobial Antifungal	

Ghee	Ghee	-	Antibacterial Antifungal Best first aid	

Formulation table

Novel Poly Herbal Antibacterial & Antifungal Cream Formulation Table No. 1: -

Sr. No.	Formula	Qty (gm)
1.	Cyminum Cornium (Jeera)	2 gm
2.	Sulphur (Gandhak)	2 gm
3.	Piper Nigrum (Mire)	2 gm
4.	Blue Vitrol	2 gm
5.	Turmeric	2 gm
6.	Nagkeshar Flower	2 gm
7.	Piper Longum	2 gm
8.	Potassium Alum (Turti)	2 gm
9.	Ghee	q.s.

Procedure[5,6]

1. Collect the whole ingredient properly.
2. Grind the entire ingredient properly.
3. Passed the whole ingredient in the sieve (No 60)
4. Mix all ingredients properly.
5. Take the whole ingredient into the porcelain dish.
6. Take water into the water bath and heat up to the 40°C
7. Add ghee up to the sufficient quantity.
8. Then mix it properly to all ingredients.
9. Triturate it properly with the help of Mortar Pestle for propor binding.
10. Then keep it into upto the 30°C

Evaluation test[6,7]

1. **Characterization of herbal antibacterial, antifungal cream:** Physical evaluation Physical parameters such as colour, odour, and appearance were evaluated.
2. **pH determination:** The pH of various gel formulations was determined by using digital pH meter. 2.0gm of cream was accurately weighed and dispersed in 20 ml of distilled water and stored for two hours. The measurement of pH was carried out. The pH values are represented. The pH of dispersions was measured using pH meter.

3. **Type of emulsion under dye test:** Scarlet red dye mixed with cream. Take drop into cream-dye mixture and placed on microscopic slide and covered with cover slip. Examined under microscope which type of emulsion.
4. **Irritancy test:** An area (1cm²) on the dorsal left-hand surface was marked. The cream was applied on this marked surface. Then irritancy, erythema, edema was checked for regular time interval up to 24 hrs and the time was noted and reported.
5. **Spread ability:** Formulation placed between two glass slides and 100gm weight was placed on the upper glass slide for 5 min to compress the formulation to uniform thickness. Weight 50gm was added to the pan. The time in seconds require to separate the two slides was taken as measure of spreadability.
6. **Viscosity measurement:** Viscosity of cream was determined by using Brookfield rotational viscometer at 5,10,20,30 and50 rpm. Each reading was taken after equilibrium of the sample at the end of two minutes. The samples were repeated three times.
7. **Microbial test:** Nutrient agar, nutrient broth media was used in microbial growth study. In this method the blank and sample Petri plates were used and cream sample were aseptically transferred on to the sample plates in a cross pattern, the microbial growth was observed. Antimicrobial activity was assessed against staphylococcus aureus, E. coli strain after 24hrs, 48hrs and 72hrs, found to exhibit significant antimicrobial activity.
8. **Stability study:** For in vitro evaluation of herbal antibacterial, antifungal cream was placed at different temperatures i.e., at 8, 25 and 40˚C and 40˚C at 75% RH (relative humidity) in stability chambers for 28 days. Any change in colour, liquefaction, phase separation, conductivity and pH were observed and record.

3. RESULT AND DISCUSSION

3.1. Physical evaluation: Colour, Odour and appearance of the cream is checked and is as mentioned below in Table no 3

3.2. pH determination: The pH of cream formulations was determined by using digital pH meter. 2gm of gel was accurately weighed and dispersed in 20ml of distilled water and stored for two hours. The measurement of pH was carried out.

The pH value is 4.87

3.3. Type of emulsion: Scarlet red dye mixed with cream. Take drop into cream-dye mixture and placed on microscopic slide and covered with cover slip. Examined under microscope which type of emulsion. and the result was noted and reported in table no 3

3.4. Irritancy: An area (1cm²) on the dorsal left-hand surface was marked. The cream was applied on this marked surface. Then irritancy, erythema, edema was checked for regular time interval up to 24hrs and the result was noted and reported in table no 3

3.5. Spreadability: Formulation placed between two glass slides and 37gm weight was placed on the upper glass slide for 5 min to compress the formulation to uniform thickness. The time in seconds require to separate the two slides was taken as measure of spreadability. The value of spreadability was calculated as 7.4 gm/cm/sec.

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

3.7. Viscosity measurement: Viscosity of cream was determined by using Brookfield Rotational Viscometer at 5,10,20,30,50rpm. Each reading was taken after equilibrium of the sample at the end of two minutes.

Table no. 2

RPM	%	CP
5	10.8	20200
10	27.2	11520
20	20.1	9420
30	47.8	14930
50	37.8	7090

3.8. Microbial test: Tested microorganisms: CANDIDA ALBICANS & Ecoli.

The anti-fungal activity experiment with sample HC1, showing a zone of inhibition (ZOI) of 18.40 mm, indicates a moderate level of anti-fungal activity against the tested fungal strain. This suggests that HC1 may contain compounds or substances with anti-fungal properties. Further studies could include determining the minimum inhibitory concentration (MIC) of HC1, testing it against a broader range of fungal strains, and identifying the active compounds responsible for its anti-fungal properties.

Sample	Zone of inhibition (MM)
HC1	18.40

Candida albicans E-coli

Viscosity measurment

Final table showing result

Table no. 3

Sr. no.	Test	Result
1	Physical evaluation	
A.	Colour	It's Little Bit black and green in colour
B	Order	Characteristic
C	Appearance	Semisolid with smooth tecture
2	pH determination	4.87.
3	Type of emulsion	Oil-water type(O/W)
4	Irritancy	No irritation
5	Washability	Easily washable
6	Spreadability	7.4 gm/cm/sec

Diagram showing prepared cream in laboratory

Herbal antifungal cream was prepared and evaluated by using above mentioned tests/methods

Herbal antifungal cream.

CONCLUSION

The study focused on developing a stable, effective novel herbal cream and assessing its physical properties, including spreadability, pH, viscosity, irritation potential, and washability. Additionally, the cream's antifungal properties were evaluated to determine its potential as a treatment for skin infections. As per the topic of the research article we use some innovative herbal crude drugs and prepared its cream after that we evaluated that cream on different evaluation parameters From these test we conclude that the cream is used as an antibacterial, as well as antifungal.

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