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Research Article

Formulation and Evaluation of a Phytotherapeutic Antimicrobial Cream Utilizing *Curcuma longa* and *Allium sativum*

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ABSTRACT

The increasing prevalence of antibiotic resistance has necessitated the exploration of alternative antimicrobial agents. This study focuses on the formulation and evaluation of a polyherbal cream combining Turmeric (*Curcuma Longa*), and garlic (*Allium sativum*), both recognized for their potent antimicrobial properties. The herbal cream was formulated using suitable excipients including bees wax, stearic acid, emulsifying wax, liquid paraffin, methyl paraben, glycerine and rose oil to enhance its stability and efficacy. The formulation was prepared by emulsification technique and evaluated for various physicochemical parameters including physical appearance, pH, viscosity, spreadability, washability, consistency, and homogeneity. The prepared cream exhibited a smooth texture, vibrant yellow color, pleasant odor, and non-greasy consistency with good homogeneity. The pH of the formulation was found to be 5.4, which is compatible with normal skin pH. The viscosity was observed to be 15000 cps to 12000cP at 12 rpm 30 rpm, indicating suitable consistency for topical application. The spreadability value was satisfactory, demonstrating ease of application and uniform distribution on the skin. The cream also showed good washability and no greasiness. The study concluded that the formulated herbal cream is stable, safe, and effective for topical use.

INTRODUCTION

The skin is the largest organ of the human body and acts as an important protective barrier against physical, chemical, and biological challenges from the external environment. In addition to providing mechanical

protection, the skin contributes to thermoregulation, prevention of excessive water loss, immune Defence, and maintenance of physiological homeostasis. Although the intact skin provides an effective barrier against microorganisms, disruption of skin integrity through cuts, abrasions, burns, wounds, inflammation,

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or other injuries can facilitate the colonization and multiplication of pathogenic microorganisms. Microbial contamination of damaged skin may interfere with normal tissue repair and can contribute to prolonged inflammation, delayed wound healing, and development of localized infections. Therefore, antimicrobial agents incorporated into suitable topical dosage forms have considerable importance in maintaining skin health and reducing microbial burden¹.

1.1 Basic structure and function skin

The epidermis is the outer layer, it provides the first barrier against the environment and contains cells that help with protection and pigmentation. The dermis lies beneath it and contains collagen, elastin, blood vessels, nerves, glands, and hair follicles, giving skin strength, flexibility, sensation, and support for sweat and oil production.

The hypodermis is the deeper layer that connects skin to underlying tissues and stores fat for protection and insulation.¹

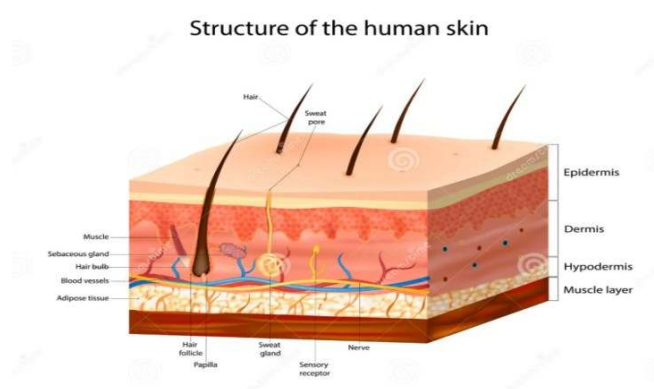


Figure: 1 Structure of Human Skin

FUNCTIONS OF SKIN:

Skin performs the following functions:

- A) **Protection:** An anatomical barrier from pathogens and damage between the internal and external environment in bodily defence, Langerhans cells in the skin are part of the adaptive immune system.
- B) **Sensation:** Contains a variety of nerve endings that react to heat and cold, touch, pressure, vibration, and tissue injury, see somatosensory system and haptics.

- C) **Heat regulation:** The skin contains a blood supply far greater than its requirements which allows precise control of energy loss by radiation, convection and conduction. Dilated blood vessels increase perfusion and heat loss, while constricted vessels greatly reduce cutaneous blood flow and conserve heat.
- D) **Control of evaporation:** The skin provides a relatively dry and semi-impermeable barrier to fluid loss. Loss of this function contributes to the massive fluid loss in burns.
- E) **Aesthetics and communication:** Others see our skin and can assess our mood, physical state and attractiveness.
- F) **Storage and synthesis:** Acts as a storage centre for lipids and water, as well as a means of synthesis of vitamin D by action of UV on certain parts of the skin².
- G) **Water resistance:** The skin acts as a water resistant barrier so essential nutrients aren't washed out of the body².

COMMON SKIN PROBLEM:

Acne is a very common inflammatory condition caused by clogged follicles with oil, dead skin cells, and bacteria.

Inflammation can also appear as **redness, swelling, itching, or irritation** in conditions such as eczema-like skin disorders. Dryness occurs when the skin barrier loses moisture, leading to tightness, flaking, and increased vulnerability to irritation or infection. Skin infections can happen when the barrier is weakened, making it easier for microbes to enter and multiply².

Causes of skin infection:

Fungal infection: Body chemistry and lifestyle can increase the risk of fungal infection. For example, you may experience multiple bouts of athlete's foot if you're a runner or if you sweat a lot. Fungi often grow in warm, moist environment. Wearing sweaty or wet clothes is a risk factor for skin infection

- **Bacterial skin infection:** This occurs when bacteria enter the body through a break in the skin such as cut or scratch. Getting a cut or scratch doesn't

necessarily means you'll develop a skin infection, but it does increase your risk if you have a weakened immune system. A decrease immune system can be result of an illness or the side effect of medication

- **Viral skin infection:** The most common viruses come from one of three groups of viruses; poxvirus, human papilloma virus and herpes virus
- **Parasitic skin infection:** Tiny insect or organism borrowing underneath your skin and laying eggs can cause a parasitic skin infection.

The increasing interest in plant-derived medicines has encouraged researchers to investigate medicinal plants as potential sources of biologically active compounds. Natural products have historically provided a valuable source of therapeutic agents, and medicinal plants contain diverse phytoconstituents such as polyphenols, flavonoids, terpenoids, alkaloids, tannins, glycosides, and organosulfur compounds. These constituents may possess antibacterial, antifungal, antioxidant, anti-inflammatory, and wound-healing properties. Consequently, herbal topical preparations are being investigated as potential alternatives or complementary approaches to conventional antimicrobial preparations².

1.2 CREAM:

Creams are the topical preparations which can be applied on the skin. Creams are defined as "viscous liquid or semi-solid emulsions of either the oil-in-water or water-in-oil type" dosage forms which consistency varies by oil and water. Creams are used for cosmetic purposes such as cleansing, beautifying, improving appearances, protective or for therapeutic function.

These topical formulations are used for the localized effect for the delivery of the drug into the underlying layer of the skin or the mucous membrane. These products are designed to be used topically for the better site-specific delivery of the drug into the skin for skin disorders

Creams are considered as a pharmaceutical product as they are prepared based on techniques developed in the pharmaceutical industry, unmedicated and medicated creams are highly used for the treatment of various skin conditions or dermatoses. Creams can be ayurvedic,

herbal or allopathic which are used by people according to their needs for their skin conditions.

TYPES OF CREAMS:

They are divided into two types:

- **Oil-in-Water (O/W):** creams which are composed of small droplets of oil dispersed in a continuous phase, and an emulsion in which the oil is dispersed as droplets throughout the aqueous phase is termed an oil-in-water (O/W) emulsion.
- **Water-in-Oil (W/O):** creams which are composed of small droplets of water dispersed in a continuous oily phase. When water is the dispersed phase and an oil the dispersion medium, the emulsion is of the water-in-oil (W/O) type².

CLASSIFICATION OF CREAMS:

All the skin creams can be classified on different basis:

1. According to function, e.g. cleansing, foundation, massage, etc.
2. According to characteristics properties, e.g. cold creams, vanishing creams, etc.
3. According to the nature or type of emulsion:
4. Make-up cream (o/w emulsion): a) Vanishing creams. b) Foundation creams.
5. Cleansing cream, Cleansing milk, Cleansing lotion (w/o emulsion)
6. All-purpose cream and general creams.
7. Night cream and massage creams.
8. Skin protective cream.
9. Hand and body creams.
10. Winter cream (w/o emulsion): a) Cold cream or moisturizing creams.

These creams are used more nowadays than before. These creams are somewhat oily but non-greasy type and can spread on the skin easily. These creams also used for antimicrobial and antifungal activity. And protective creams for prevention or alleviation of sunburns or for the treatment of roughened skin area³.

APPLICATIONS OF HERBAL CREAMS:

- Minimize sunburn.



- Promote skin hydration retention.
- Make the skin more smooth.
- Diminish roughness on the skin.
- Cut down on creases.
- Address skin issues such as acne and scars.

ADVANTAGES:

- Because of their natural composition, they tend to elicit fewer negative reactions.
- Herbal creams consider the connection between general health and skin health.
- They provide formulation versatility to address particular skin issues.
- Herbal creams, abundant in vitamins and antioxidants, revitalize and nourish the skin derived from plants.

DISADVANTAGES:

- Lack of standardization of ingredients.
- Limited scientific evidence of efficacy.
- Slower therapeutic action.
- Shorter shelf life.

1.3 TURMERIC

Among medicinal plants, **turmeric (*Curcuma longa* Linn.)** has attracted considerable scientific attention because of its diverse pharmacological activities. Turmeric belongs to the family **Zingiberaceae** and its rhizome has been traditionally used in Indian and other Asian systems of medicine. The major biologically active constituents of turmeric are **curcuminoids**, including curcumin, demethoxycurcumin, and bis-demethoxycurcumin. Curcumin is regarded as the principal bioactive polyphenolic constituent and is responsible for much of the characteristic yellow colour of turmeric. In addition to curcuminoids, turmeric contains volatile oils and other phytoconstituents that may contribute to its biological activities⁴.



Figure: 2 Plant of Turmeric



Figure: 3 Turmeric Powder

Curcumin has been extensively investigated for its antimicrobial, antioxidant, anti-inflammatory, and wound-healing properties. Its antimicrobial activity has been reported against several bacterial and fungal organisms, although the degree of activity varies considerably depending on the microorganism, strain, concentration, and experimental conditions. Studies indicate that curcumin may interfere with microbial cellular processes and membrane integrity, thereby contributing to inhibition of microbial growth. Importantly, its antimicrobial activity should not be considered uniformly broad-spectrum, because susceptibility can vary among different microorganisms and clinical isolates.

The potential role of turmeric in wound management is particularly relevant to topical formulations. Wound healing is a complex biological process involving overlapping phases of **hemostasis, inflammation, proliferation, and tissue remodeling**. Excessive inflammation, oxidative stress, and microbial contamination can negatively affect this process. Curcumin has been investigated for its ability to modulate inflammatory and oxidative pathways while supporting processes associated with tissue repair. Reviews of

curcumin-based delivery systems have therefore explored topical preparations such as hydrogels, films, nanoparticles, nanofibers, and other systems designed to improve its local delivery.

However, despite its promising biological properties, curcumin presents certain pharmaceutical challenges. It has **poor water solubility and limited bioavailability**, which can restrict its effective delivery. The development of an appropriate topical dosage form can help provide the active constituents directly at the site of application and may overcome some limitations associated with systemic administration. A semisolid formulation can also provide prolonged contact with the skin and facilitate convenient application⁵.

1.4 GARLIC:

Another medicinal plant of considerable importance is **garlic (*Allium sativum* Linn.)**, belonging to the family **Amaryllidaceae**. Garlic has been used traditionally as both a food ingredient and medicinal plant. Its biological activities are associated largely with sulfur-containing compounds, including **alliin, allicin, ajoene, diallylsulfides, and related organosulfur compounds**. Garlic has been investigated for antibacterial, antifungal, antioxidant, anti-inflammatory, and other pharmacological properties.



Figure: 4 Garlic

The most important antimicrobial constituent associated with freshly crushed garlic is **allicin (diallylthiosulfinate)**. Allicin is not present in substantial amounts in intact garlic tissue; rather, it is rapidly generated when garlic tissue is damaged. The enzyme **alliinase** catalyzes the conversion of alliin into allicin following disruption of the garlic cells. Allicin is chemically reactive and can interact with thiol-containing groups in proteins and cellular components of microorganisms. These interactions can interfere with

essential microbial enzymes and metabolic pathways and contribute to antimicrobial activity.

Garlic-derived preparations have demonstrated activity against a variety of microorganisms, including both **Gram-positive and Gram-negative bacteria**, as well as certain fungi. Reported susceptible organisms include *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Streptococcus* species, *Salmonella* species, and others. Allicin has also been investigated against antibiotic-resistant organisms, including methicillin-resistant *Staphylococcus aureus* (MRSA). Nevertheless, antimicrobial activity can differ depending on the garlic preparation, extraction method, concentration, stability of active constituents, and test organism.⁶

The combination of **TURMERIC AND GARLIC** provides an interesting basis for the development of a **polyherbal antimicrobial formulation**. The concept of polyherbal therapy is based on combining medicinal plants containing multiple bioactive constituents, potentially providing complementary pharmacological effects. In the proposed formulation, curcuminoids and other turmeric constituents can contribute antimicrobial, antioxidant, and anti-inflammatory activities, whereas garlic-derived organosulfur compounds, particularly allicin, can contribute additional antimicrobial activity. Thus, combining the two herbs may provide a broader pharmacological rationale than relying on a single plant extract. However, any claim of synergistic antimicrobial activity should be experimentally established rather than assumed.

The choice of a **cream** as the dosage form is also important. Creams are semisolid topical preparations designed to facilitate application of active ingredients to the skin. They generally provide good spreadability, ease of application, acceptable cosmetic characteristics, and intimate contact with the skin surface. Depending on the type of cream and excipients used, the formulation can provide appropriate drug/extract incorporation, improve residence time at the application site, and support controlled or prolonged release of active constituents. The incorporation of suitable excipients such as **emulsifying wax, beeswax, oils, humectants, preservatives, and purified water** can

help achieve the desired consistency, stability, spreadability, and skin feel.

A polyherbal cream containing turmeric and garlic therefore represents an interesting approach for investigating the topical application of plant-derived antimicrobial agents. The formulation can be designed to deliver the herbal constituents directly to the skin while minimizing the need for systemic administration. Same research has also explored topical formulations containing *Curcuma longa* for antimicrobial and wound-healing applications, supporting the scientific rationale for further investigation of turmeric-based semisolid preparations.

Nevertheless, formulation of a polyherbal cream requires careful consideration of several factors. Plant extracts may vary in their phytochemical composition depending on geographical origin, cultivation conditions, extraction method, storage conditions, and processing. In addition, compounds such as allicin can be chemically unstable, making extraction, incorporation, storage, and formulation conditions important considerations. The interaction between herbal constituents and formulation excipients can also influence physical stability, release characteristics, antimicrobial activity, and shelf life.

Therefore, the development of a **turmeric and garlic polyherbal antimicrobial cream** should involve systematic formulation and evaluation. The prepared cream can be evaluated for **appearance, colour, odor, homogeneity, pH, viscosity, spreadability, extrudability, washability, phase separation**. Antimicrobial efficacy may be investigated against selected microorganisms using appropriate microbiological methods such as agar diffusion or other validated antimicrobial susceptibility techniques⁷.

2.0 MATERIALS AND METHODS

2.1EXTRACTION

Extraction is the first step to separate the desired natural constituents from the crude materials.

A) EXTRACTION OF GARLIC BY MACERATION PROCESS

50gm was weighed and crushed with the help mortar pestle. The Crushed garlic was exposed to environment for 10 to 15 minutes so, that there is conversion of alliin to allicin by enzyme allinase. Then 25ml Sesameoil was poured in crushed garlic and mixed with help of stirrer. Then the container was wrapped with aluminum foil and kept for 7 days occasionally shaking macerate. After 7 days, the oil was separated from crushed garlic by filtration by using cloth. The crushed garlic was placed in the piece of cloths and oil traces were removed by applying pressure. The concentrated part is also removed along with oil so, as to obtain a clear oil macerate.⁽⁸⁾



Figure: 5 Extracted Garlic Oil

2.2)CHEMICAL TEST FOR GARLIC

Table: 1 Chemical Test Garlic⁽⁹⁾

TEST	INFARENCE	RESULT
Sodium nitroprusside test Take about 1-2ml of garlic extract in a test tube ,and add few drop of sodium nitroprusside solution mix well observe the colour	Development of a Purple /Violet colour indicates the presence of sulfur –containing compound such as Allicin.	Presence ofAllicin

TEST	INFERENCE	RESULT
Ninhydrin Test Take about 1-2ml of garlic extract in a test tube, add few drops of ninhydrin reagent, heat gently in a water bath for a few minutes allow it cool and observe.	Purple / Blue colour indicates the presence of amino acid containing compound such as Alliin	Presence of Alliin

B)MACERATION PROCESS OF TURMERIC

The maceration involves mixing turmeric powder with a solvent like Ethanol, (1:10)

Take 30gm of turmeric powder in a 500ml beaker, then add 300ml of ethanol then stand for a week and shaking occasionally. The mixture is strained through cheese cloth to separate the liquid extract which can be concentrated through evaporation if needed. This process extract Curcuminoids from turmeric.¹⁰

Figure: 6.Turmeric & Ethanolmixture FigNo: 7.Turmeric Extract



2.3) CHEMICAL TEST FOR TURMERIC

Table: 2 Chemical Test for Turmeric⁽¹¹⁾

TEST	INFERENCE	RESULT
Alkaling reagent test Take 1-2ml turmeric extract + add few drop of 10% NaoH. Mix	Red / Reddish – Brown colour	Curcuminoid presence
Dragendorff's test Take 1-2ml of turmeric extract then add dragendorff's reagent	Orange precipitate	Alkaloids presence

2.4) FORMULATION OF POLYHERBAL CREAM

Table: 3 Formulation of Polyherbal Cream

COMPONENTS	F1	F2	F3	F4
TURMERIC	1%	1%	1%	1%
GARLIC	1%	1%	1%	1%
BEE'S WAX	2%	4%	2%	3%
STEARIC ACID	3%	3%	5%	4%
EMULSIFYING WAX	8%	6%	10%	8%
LIQUID PARAFFIN	8%	10%	8%	12%
METHYL PARABEN	0.05%	0.05%	0.05%	0.05%
GLYCERINE	5%	8%	5%	10%
ROSE OIL	0.01%	0.01%	0.01%	0.01%
WATER	QS	QS	QS	QS

PROCEDURE:



Oil phase:-

- Take beeswax, liquid paraffin, emulsifying wax, and stearic acid in a beaker and kept it in a water bath to melt the mixture and maintain the temperature upto **75°C** until all the components are uniformly mixed.

Water phase:

- Glycerine, methyl paraben, and water were accurately weighed, transferred into another beaker, and placed in water bath for mixing until a homogeneous mixture was obtained, temperature was maintained to **75°C**.
- The oil phase was slowly added to the aqueous phase with continuous emulsification using a magnetic stirrer for 15–20 minutes until a homogeneous emulsion was obtained
- The mixture was allowed to cool to 40°C, followed by the addition of turmeric and garlic extract. The mixture was continuously stirred for 15–20 minutes to ensure uniform mixing. Finally, rose oil was added, the mixed uniform until the cream was prepared.⁽¹²⁾

2.5)EVALUATION OF CREAM

1. Physical evaluation
2. Physicochemical evaluation

• Physical evaluation:

• Colour:

The colour of the herbal cream depends on the ingredients used. If the color changes after a few days, it may indicate oxidation of the ingredients. This herbal cream formulation has a vibrant yellow colour.

• State:

The state of the herbal cream depends on the proportion of its phases. A good herbal cream should be stable and consistent. This particular herbal cream is semi-solid.

• Consistency:

The cream should be smooth and homogeneous without visible clumping. Consistency was evaluated by manually rubbing a small amount of cream on the skin.

This herbal cream is smooth and leaves a uniform layer on the skin.

• Odor:

The Odor of the cream was found to be pleasant.

• Washability:

The Washability test was conducted by applying a small amount of cream to the hand and then rinsing it with tap water. All four formulations were found to be easily washable.

• Greasiness:

This test is basically used to check nature of cream either oily or grease. According to results we can say that all formulations are Non greasy.

• Physicochemical evaluation:

Physicochemical parameters were determined, including the determination of pH, viscosity and spreadability, washability, Phase separation.

• pH:

The pH value of freshly formulated cream was determined using a digital pH meter at room temperature⁽¹³⁾

• Viscosity:

The viscosity of the formulation was determined at room temperature using Brookfield Viscometer equipped with spindle No.3 at 12RPM and 30RPM. Taking care that the spindle did not touch the bottom of the beaker. The readings were recorded⁽¹⁴⁾

• Spreadability:

The spreadability 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 spreadability. 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.⁽¹⁵⁾

- **Phase Separation:** The prepared cream was packed in a dry container and stored in a dark area for 30 days to observe any phase separation. This test assesses the creams ability to retain a uniform consistency and stability throughout its intended shelf life.⁽¹⁶⁾

3.1 Physical Evaluation:

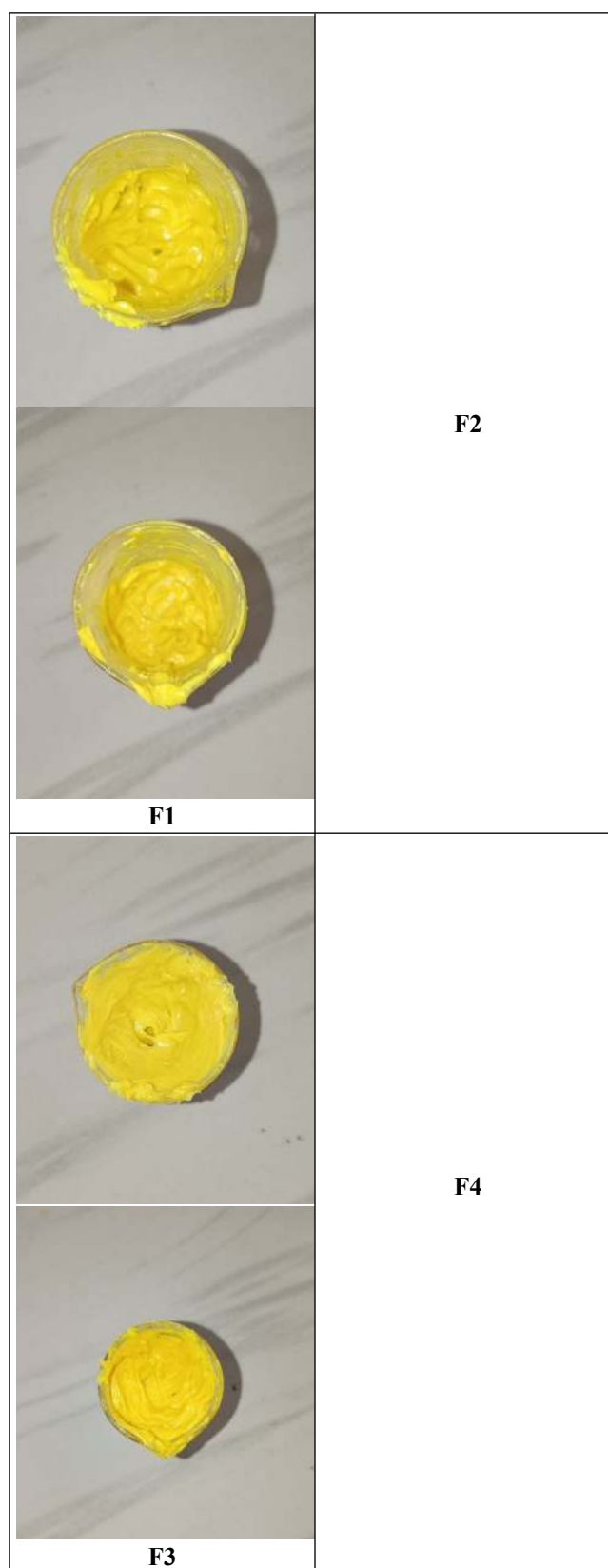
The prepared formulation was evaluated for color, odor, and consistency. The color of the cream was observed visually and appeared faint yellow. The odor of the cream was pleasant. The cream state was also examined visually and found to be semisolid in nature. The formulation's consistency was assessed by manually rubbing it on the hand, revealing a smooth texture. Results are listed in table 4.

3.0 RESULT AND DISCUSSION

Table 4: Results of Physical Evaluation

<i>Physical Evaluation</i>	<i>F1</i>	<i>F2</i>	<i>F3</i>	<i>F4</i>
<i>Parameters</i>	<i>Observations</i>			
<i>Colour</i>	<i>Yellow</i>	<i>Yellow</i>	<i>Yellow</i>	<i>Yellow</i>
<i>Odour</i>	<i>Pleasant</i>	<i>Pleasant</i>	<i>Pleasant</i>	<i>Pleasant</i>
<i>State</i>	<i>Semisolid</i>	<i>Semisolid</i>	<i>Semisolid</i>	<i>Semisolid</i>
<i>Appearance</i>	<i>Smooth and creamy</i>	<i>Smooth and creamy</i>	<i>Smooth and creamy</i>	<i>Smooth and creamy</i>
<i>Texture</i>	<i>Non-greasy</i>	<i>Non-greasy</i>	<i>Non-greasy</i>	<i>Non-greasy</i>
<i>Homogeneity</i>	<i>Uniform</i>	<i>Uniform</i>	<i>Uniform</i>	<i>Uniform</i>

Figure: 8 Formulations of Polyhedral Cream



3.2) Physicochemical Test

• pH determination :-

The pH of the cream was measured with a pH meter. The pH of all the formulations was ranging to neutral. Results are listed in table no. 5

Table 5: pH Determination

SI.No	Formulation	Results
1	F1	5.42
2	F2	5.52
3	F3	5.72
4	F4	5.46

Normal pH range

- Natural skin surface pH :approximately 4.5-5.5
- Generally acceptable range for topical /Herbal creams: Approximately 4.5-6.5.

The pH of formulated herbal creams was found to be in the range of 5.42 -5.72. F1, F3 and F4 were within the

generally accepted pH range of 4.5-6.5 for topical herbal creams. All formulations pH was found closest to the natural acidic pH of the skin and results was found satisfactory.

• Spreadability Test :-**Table 6: Spreadability Test**

SI No	Formulation	Time	Result
1	F1	1.1	3.35
2	F2	1.3	3.91
3	F3	1.2	4.58
4	F4	1.3	4.51

The spreadability of the formulated herbal creams was found to be in the range of 3.35-4.58. Among all the formulations, F3 showed the highest spreadability (4.58) with a relatively short spreading time of 1.2

seconds. Therefore, F3 was considered the better formulation based on spreadability, as it can be easily and uniformly applied over the skin.

• Viscosity Determination :**Table 7: Viscosity Determination**

SI. No	Formulation	12rpm	30 RPM
1	F1	15000	5246
2	F2	12723	4285
3	F3	12806	4141
4	F4	12728	4286

The viscosity was found in the range of indicating good consistency and suitable viscosity for topical application.

in apparent viscosity from 15000 to 12000 cps as the spindle rotational speed increases from 12 rpm to 30 rpm.

The formulation exhibit non-newtonian, shear thinning pseudoplastic behavior, This is conformed a decrease

• Washability test :**Table 8: Washability Test**

SI.No	Formulation	Results
1	F1	Washable
2	F2	Washable
3	F3	Washable
4	F4	Washable



The washability test showed that all the formulation (F1,F2,F3 and F4) were easily washable with water. This indicates that the prepared herbal creams can be readily

Removed from the skin after application and do not leave excessive residue. Therefore, all four formulations showed satisfactory results.

• **Greasiness :**

Table: 9 Greasiness

Sl.No	Formulation	Results
1	F1	Non-greasy
2	F2	Non-greasy
3	F3	Non-greasy
4	F4	Non-greasy

The Greasiness test showed that all the formulated herbal creams (F1,F2,F3 and F4) were non- greasy. This indicates that the formulation have a pleasant texture and do not leave an excessive oily are greasy

residue on the skin. Therefore, all four formulation showed satisfactory result with respect to greasiness.

• **Phase separation:**

Table: 10 Phase Separation

Sl.No	Formulation	Results
1	F1	No Phase separation observed
2	F2	No Phase separation observed
3	F3	No Phase separation observed
4	F4	No Phase separation observed

The phase separation test showed that no phase separation was observed in any of the formulated herbal creams (F1, F2, F3 and F4). This indicates that all the formulations were physically stable and maintained good emulsion stability during the observation period. Therefore, all four formulations showed satisfactory results with respect to phase separation.

4.0 SUMMAY AND CONCLUSION

The present study successfully formulated a polyherbal cream incorporating Turmeric (*Curcuma Longa*) and garlic (*Allium sativum*), both of which are renowned for their robust antimicrobial activities. The choice of these herbal ingredients is not only grounded in their traditional uses but also supported by scientific literature. Both Turmeric and garlic possess a multitude of bioactive compounds that contribute to their antimicrobial effectiveness, making them suitable candidates for a topical formulation aimed at managing skin infections and improving overall skin health.

The maceration process utilized for the extraction of active constituents allowed for the retention of essential properties of Turmeric and garlic, which were then

integrated into the cream formulation with carefully selected excipients.

The herbal cream was formulated using suitable excipients including bees wax, stearic acid, emulsifying wax, liquid paraffin, methyl paraben, glycerine and rose oil to enhance its stability and efficacy. The formulation was prepared by emulsification technique and evaluated for various physicochemical parameters including physical appearance, pH, viscosity, spreadability, washability, consistency, and homogeneity.

The cream's smooth texture, vibrant yellow color, and pleasant aroma reaffirmed the expected quality of a formulation enriched with natural ingredients.

The pH level of 5.4 indicates compatibility with human skin, suggesting that the product should minimize potential irritations upon application. Moreover, the viscosity measurements ranging between 15000 cps and 12000 cps indicate that the cream possesses a suitable thickness for topical use, facilitating ease of application without compromising spreadability.

Spreadability of F3 was notably superior, with a spreadability value of 4.58 g cm/sec. This finding



highlights F3's potential for ease of use, while other formulations (F1, F2, and F4) also showed promising characteristics, suggesting that these ingredients could enhance the application experience of topical creams. A satisfactory results of spreadability enhances user experience, allowing for uniform distribution upon application to the skin surface.

Good washability, coupled with the cream's non-greasy feel, addresses common complaints associated with many topical products while contributing to patient satisfaction. Such attributes are essential for improving compliance, particularly in populations needing consistent application for effective management of skin conditions. Furthermore, the overall stability of the formulated cream, assessed through its continuous homogeneity and physical characteristics, confirms its potential as a reliable therapeutic agent in dermatological applications. The findings of this study underscore the viability of utilizing herbal extracts in contemporary pharmaceutical formulations, thus aligning with the growing trend towards natural remedies in the face of declining effectiveness of synthetic antibiotics.

Future work should investigate the diffusion study and clinical efficacy of this polyherbal cream through controlled trials, assessing its performance against release and specific skin pathogens and its potential for promoting faster healing processes. Additionally, further phytochemical analyses could elucidate the distinct mechanisms by which these herbal compounds exert their antimicrobial effects. In summary, the developed polyherbal cream represents a significant advancement in the field of alternative antimicrobial therapies, bringing together traditional herbal medicine and modern formulation science. This study not only advances the understanding of herbal synergies but also paves the way for future innovations in therapeutic creams designed to combat rising microbial resistance, offering a promising alternative for safe and effective skin care solutions. The integration of natural products holds substantial potential, not merely in treating infections but also in fostering a holistic approach toward skin health.

REFERENCES

1. : Ikramuddin Khan, Rehan Rafique, Shivani Siwach, Dinesh Upadhyay, Subhranshu Panda (2026) Formulation and evaluation of herbal turmeric cream. World Journal of Pharmaceutical Science and Research, 5 (5), pg: xx-xx.
2. Chauhan L, Gupta S, Creams: A Review on Classification, Preparation Methods, Evaluation and its Applications, Journal of Drug Delivery and Therapeutics. 2020; 10 (5-s):281-289
3. Arfi Khan, Samn Moin and DR. Rajesh Yadav department of pharmacy, Mohammad Ali Jauhar university, Ramapur UP,India
4. Kalyani Khairnar*, Jitesh Desale, Mayur Gangu, Formulation and Evaluation of Herbal Cream Containing Curcumin from Curcuma Longa, International journal of pharmaceutical sciences [ISSN: 0975-4725]
5. Manoj A Suva1*, Komal V Dubal1, Preparation and Evaluation of Garlic Extract Containing Herbal Anti-acne Gel Inventi Rapid: Cosmeceuticals Vol. 2014, Issue 3 [ISSN 0976-3864]
6. Nilesh Dehariya, Proshanta Guha and Rakesh Kumar Gupta DOI: <https://doi.org/10.22271/chemi.2021.v9.i1u.1142> 6 Extraction and characterization of essential oil of garlic (*Allium sativa* L.)
7. Melak Mohammed Al-Busaid,1 Md. Sohail Akhtar,1 Tanveer Alam,2 Wegdan Aly Shehata1 1School of Pharmacy, College of Pharmacy and Nursing, University of Nizwa, Sultanate of Oman Natural and Medical Sciences Research Center, University of Nizwa, Sultanate of Oman
8. Madhuri Grover 1, Tapan Behl 2*, Aayush Sehgal 2, Sukhbir Singh 2, Neelam Sharma 2, Tarun Virmani 1 Mahesh Rachamalla 3, Abdullah Farasani 4,5, Sridevi Chigurupati 6, Amal M. Alsubayiel 7, Shatha Ghazi Felemban 8, Mohit Sanduja 1 and Simona Bungau 9,
9. Determination and Estimation of Allicin in *Allium sativum* Sirjan Singh1, Asha Jha2, Sourya Acharya3, Samarth Shukla4, Neema Acharya5
10. Shyam Pawar*, Suraj Raut, Pragati Shinde, Swati Deshmukh Shraddha Institute of Pharmacy,



Washim, Maharashtra, India. INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES [ISSN: 0975-4725]

11. Kokate C.K., Purohit A.P., Gokhale S.B. Pharmacognosy, Nirali Prakashan. Khandelwal K.R. Practical Pharmacognosy: Techniques and Experiments, Nirali Prakashan.
12. Sreethu K Sreedharan1*, Anoop Sebastian2, Amritha.R2, Aiswarya C. S2, Alwin Francis M2 1. Department of Pharmaceutics, Grace College of Pharmacy, Kodunthirapully, Palakkad, Kerala, India. 2. Department of Pharmaceutics, Nehru College of Pharmacy, Pampady, Thrissur, Kerala, India
13. Kalyani Khairnar*, Jitesh Desale, Mayur Ganguarde S.V.S Institute of Pharmacy, Mungase, at post Malegaon, Nashik.
14. Ravi Shankar1, Babita Sarangi1, Ramesh Gupta1, Kamla Pathak2* 1Dr. K. N. Modi Institute of Pharmaceutical Education and Research, Modinagar, Ghaziabad, 201201, U. P., India.
15. Abdurahman HN and Rosli MY. Stability investigation of water-in-crude oil emulsion. J Appl Sci 2006; 6:2895-98.
16. Akhtar N, Khan BA, Khan MS, Mahmood T, Khan HMS and Iqbal M. Formulation development and moisturising effects of a topical cream of Aloe vera extract. World Acad Sci Eng Tech 2011; 51:172-180.
17. Ahamad I, Mehmood Z and Mohammad F. Screening of some Indian medicinal plants for their antimicrobial properties. J Ethnopharmacol 1998; 62:183-193.
18. Magdy IM. Optimization of chlorphenesin emulgel formulation. AAPS J 2004; 6:1-7.
19. Masmoudi H, Piccerelle P and Kister J. The evaluation of cosmetic and pharmaceutical emulsions, aging process using classical techniques and a new method: FTIR. Int J Pharm. 2005; 289:117-131.
20. Das K, Dang R and Machale MU. Formulation and evaluation of a novel herbal gel of Stevia extract. Iran J Dermatol 2009;12 (4):117-122.

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