



# Formulation and Evaluation Of Multipurpose Antimicrobial Cream

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**Abstract:** Herbal cosmetics are the preparations used to enhance the human appearance. The aim of the present research was to formulate the herbal Cream for the purpose of Moistening, Nourishing & Treatment of various diseases of the skin such as scabies, eczema, ringworm and other bacterial infection. Different herbal ingredients like camphor, coconut oil, sulphur, bees wax and borax are taken to prepare this antibacterial cream. Evaluation of the final cream done by using different evaluation methods, such as Colour, odour, appearance and different test like Stability Test, spread ability test, wash ability test, PH. The results shown that cream gave satisfied results.

**Key words:** herbal Cream, scabies, eczema, bacterial infection, camphor.

## 1. INTRODUCTION

The word 'Cosmetic' derived from a Greek word – 'kosmesticos' that means to adorn. From that time any materials used to beautification or promoting appearance is known as cosmetic.<sup>i</sup>

The demand of cosmetics due to the availability of herbal cosmetics is increasing predominantly.<sup>ii</sup>

To address wrinkles, acne and oil overproduction, various types of skin care items were made. Skin guards, sun screens, acne treatments, wrinkle removers and age-reducers were created to address different types of skin diseases. These products are used in different forms and they are produced from a variety of materials which are either natural or synthetic. Herbal medicine is one of the oldest health care system.

The Advancement in the field of herbal drug delivery started recently with the aim to manage human diseases efficiently. World Health Organization (WHO) estimates that 80% of the world populations presently use herbal medicine for primary health care. Every nation is seeking health care beyond the traditional boundaries of modern medicine; turning to self medication in the form of herbal remedies.<sup>iii</sup>

Over the last decades the treatment of illness has been accomplished by administrating drugs to human body via various routes namely oral, sublingual, rectal, parental, topical, inhalation etc.<sup>iv</sup>

Creams are semisolid emulsions intended for apply on skin.

Herbal cream is a preparation in the form of an o/w emulsion that contains oil-phase and aqueous-phase constituents. Being water miscible, it can easily be washed away if it is greaseless, cream-like or non-sticky. It is probably the most frequently used topical drug. Most patients consider it more convenient to apply because it is less oily, less greasy or less sticky.

Antibacterial activity refers to substances (medications) that extinguish or slow down the growth of bacteria. A massive number of antibiotics have been revealed to tackle various types of infections.<sup>v</sup>

### 1.1 Topical drug delivery system:

Over the last decades the treatment of illness has been accomplished by administering drugs to human body via various routes namely oral, sublingual, rectal, parental, topical, inhalation etc. Topical delivery can be defined as the application of a drug containing formulation to the skin to directly treat cutaneous disorder or the cutaneous manifestations of a general disease (eg. psoriasis) with the intent of containing the pharmacological or the effect of drug to the surface of the skin or within the skin semisolid formulations in all their diversity dominate the system for topical delivery, but foams, spray, medicated powders, solutions and even medicated adhesive systems are in use.<sup>i</sup>

The most common form of transdermal pharmaceutical remedies is characterized by various kinds of semi-solid availability methods.

#### Advantages of topical drug delivery system:

1. It avoids first pass metabolism.
2. Convenient and easy to apply by patient
3. Avoid of risk and have less risk of toxicity
4. Inconveniences of intravenous therapy and of the varied conditions of absorption like PH changes presence of enzymes gastric emptying time etc.
5. Varying levels of drug among patients for example those within the same individual should be discouraged.
6. Easy to use while travelling.

#### Disadvantages of topical drug delivery system:

1. Most drugs have a high molecular weight and are poorly lipid soluble, so are not absorbed via skin Membrane and due to this can get less effect.
2. Very slow absorption, it takes longer time to penetrate.
3. It can be used only for those drugs which need very small plasma concentration for action.
4. Possibility of allergic reactions and sometimes can cause irritation.
5. Drugs of larger particle size not easy to absorb through the skin.

### 1.2 Types of Skin Creams:

#### 1.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.

**2.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) type.<sup>1</sup>

### 2.3 Physiology of Human skin:

The skin is composed of three layers,

2.3.1. Epidermis (50–100 µm)

2.3.2 Dermis (1–2 mm)

2.3.3. Hypodermis (1–2 mm)

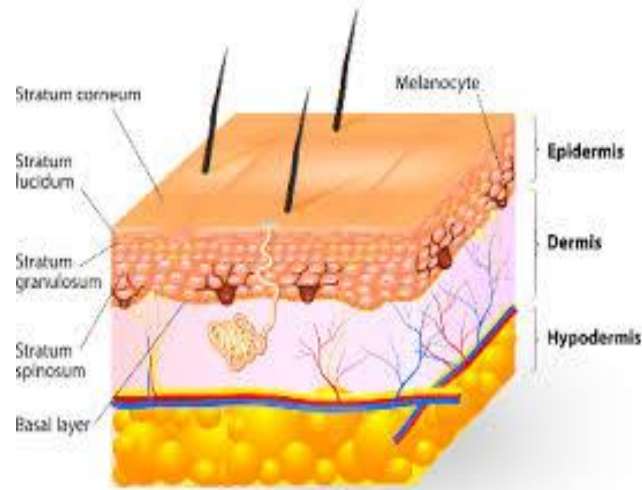


figure 1.human skin<sup>vi</sup>

### 1.3.1. Epidermis

The epidermis is the most outer layer of the skin, consisting of stratified keratinized squamous epithelium that changes its depth throughout the body. The thickness varies all over the body but is thickest on hands' palms or feet' soles. Epidermis lacks blood vessels and nerve endings within it; instead they are found lying below in its subcutaneous papillary layer full of interstitial fluid that includes oxygen and nutrients as well as lymphatic vessels as well as other body fluids

### 1.3.2 Dermis

The dermis is tough and elastic, it consists of collagen fibers intertwined with elastic fibers that rupture when the skin is stretched too much leading to permanent stretch marks known as striae gravidarum in obese women as well as pregnant ones; while collagen fibers within dermis helps to hold water making our outer covering stronger although they weaken over time causing formation of wrinkles due to reduced skin turgor force. Moreover, there are some fibroblasts along with macrophages in it too.

### 1.3.3. Hypodermis

The hypodermis is the deepest layer of skin in human body with multiple functions such as energy storage, connection between dermis and muscles or bones along with body insulation and protection against harmful factors.

## 1.4 Diseases of Skin:

### 1.4.1. Scabies:

Scabies is a skin infestation of the mite, *Sarcoptes scabiei*, which manifests as a pruritic skin eruption and can be transmitted directly through person-to-person contact and indirectly through bedsheets, clothing, or other fabric material. Scabies infection is particularly prevalent in overcrowded environment such as orphanages and public boarding schools. It is estimated that 200 million people in the world have suffered from a scabies infection at least once in their lifetime. The prevalence of scabies ranges from 0.2 to 71%. A Global Burden of Disease Study in 2015 reported that Indonesia ranks first, among the 195 countries of the world, in scabies infection.<sup>vii</sup>

### 1.4.2. Eczema (Atopic Eczema):

atopic dermatitis is a chronic, relapsing, intensely pruritic inflammatory skin disease. This skin disease is commonly associated with allergic rhinitis (hay fever or seasonal allergies) and asthma. This triad of conditions is collectively known as atopy, with affected individuals having a personal or family history of one or more of the three conditions. This word was first used in 1923 to define a domain of inherited hypersensitivity to environmental allergens, disparate from hypersensitivity and anaphylaxis to infection.<sup>viii</sup>

### 1.4.3. fungal infection

**A. Superficial: Affect skin** – mucous membrane. e.g. tinea versicolor dermatophytes: Fungi that affect keratin layer of skin, hair, nail. e.g. tinea pedis, ring worm infection Candidiasis: Yeast- like, oral thrush, vulvo-vaginitis, nail infections.

**B. Deep infections:** Affect internal organs as: lung, heart, brain leading to pneumonia, endocarditis, meningitis.<sup>iii</sup>

**1.4.4. Skin infections:** skin infections can be cause due to different harmful bacteria's which are surrounded in environment. This cause inflammation to the skin and irritation. This kind of infection are majorly cause by bacteria such as Staphylococcus aureus, Streptococcus pyogenes, and coryneform bacteria.

**2. Aim:** Formulation and evaluation of multipurpose antimicrobial cream

### 3. Objectives:

1. TO TREAT DIFFERENT TYPES OF SKIN DISEASES LIKE SCABIES, ECZEMA, RINGWORM AND OTHER FUNGAL AND MICROBIAL INFECTIONS.
2. TO EVALUATE DIFFERENT EFFECT OF CAMPHOR AND SULPHUR ON IN SKIN INFECTIONS.
3. To create multipurpose antimicrobial cream.
4. To study safety and efficacy of antibacterial cream.

### 4. purpose:

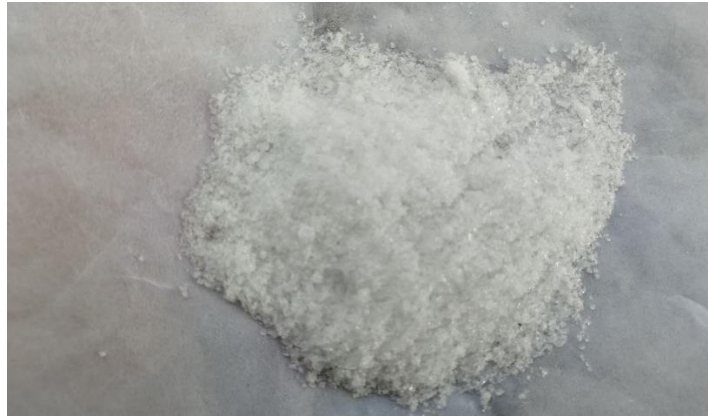
Nowadays peoples are suffering from different types of skin disorders, and some of this are very irritant and hard to cure. So this cream can be helpful.

Bhimseni Camphor have antibacterial, antifungal, anti-inflammatory properties when applied to skin topically and sulphur is also a good antibacterial agent so I we use them combinly so we can get rid from different skin infections such as scabies and ringworm.

### 5. Ingredient and their Uses:

| Ingredient       | Use                 |
|------------------|---------------------|
| Bhimseni Camphor | Antimicrobial agent |
| Sulphur          | Antimicrobial agent |
| Coconut oil      | Moisturizing agent  |
| Bees wax         | Cream Base          |
| Methyl Paraben   | Preservative        |
| Borax            | Buffering agent     |

### 5.1. Bhimseni Camphor:



*figure 2. bhimseni camphor*

According to the Ayurvedic text “Raj Nighantu,” there are around 14 different forms of Karpura (Kapur), with Bhimseni Karpura being one of the best for therapeutic reasons.

Bhimseni Camphor is a unique herb that though cooling balances Kapha Dosha lowers fat and relieves Vata induced aches and pains. The uses and benefits of bhimseni camphor are that it aids in the inflammatory reduction and relaxes the body. Camphor is endowed with skin healing property

Bhimseni Camphor, also known as Pacha Karpuram, has been an integral part of our household and prayer usage since ancient times. It naturally occurs in the stems of *Dryobalanops camphora*.<sup>ix</sup>

Pacha Kapoor, Nagi karpura, Patri Kapoor, Desi Kapoor are some other names that the substance called Bhimseni Kapoor goes by. But to your surprise; this type of camphor called Bhimseni camphor is a crystal clear one and entirely natural obtained from *Cinnamomum camphora* trees and Pines.

Bhimseni Kapoor is very different from the usual Kapoor. Bhimseni Kapoor is in contrast safe to eat in tiny proportions and is quite safe for most people with exception of little child and pregnant mothers. Shapes and sizes are not regular in Bhimseni camphors which are solely from nature.

#### Uses of bhimseni camphor:

1. It Kills Microorganisms and Germs
2. It Treats Cold and Cough
3. It can Treats Breathing Problems
4. Toothache, etc.

### 5.2. Sulphur:



*figure 3. sulphur*

Sulfur is utilized in treating various types of skin disorders such as acne, scabies, seborrheic dermatitis by using sulfur cream, lotion or ointments or a bar soap with sulfur content.

Sulphur might have that can reduce eczema's cause. It acts as an antimicrobial agent and a keratolytic substance that softens or moistens the rough and hard skin. There are also anti-inflammatory characteristics to it thus could reduce itchiness.

In past Sulphur was used in the past for treating conditions like acne vulgaris, rosacea, seborrheic dermatitis, dandruff, pityriasisversicolor, scabies and warts due to its anti-fungal, antibacterial and keratolytic actions. There is minimal onset of side effects following dermal administration of Sulphur except for slight cutaneous irritations.

#### **Health benefits of sulphur:**

1. Keratolytic
2. Mild antiseptic
3. To treat dermatitis
4. To treat scabies

#### **5.3. Coconut oil:**

Coconut oil is both popular as an ingredient in skincare products and to apply raw. When used raw it can be heavy on skin but still has many benefits and is highly nourishing. Coconut oil is majoritively made up of saturated fats that have a multitude of benefits for our skins defensive barrier function. The fats and essential amino acids in coconut oil help the barrier of our skin to remain strong, moisturised and looking great.<sup>x</sup>

Coconut oil can help to hydrate the skin and hydrate it. Plus, it can have antibacterial properties. Also, coconut oil may aid in reducing inflammation and enhancing the healing of wounds.

The protective layer of coconut oil helps repair cracks in the skin's outer surfaces faster makes it more difficult for harmful bacteria, such as Staphylococcus, a bacterium commonly present on the skins surface.

#### **Benefits of coconut oil for skin:**

1. **Coconut Oil Can Help to reduce Acne**
2. **It is a good Moisturiser**
3. **It has Antimicrobial properties**
4. **It supports healing**
5. **It can reduce inflammation**
6. **It can soften skin**

#### **5.4. Bees Wax:**

Beeswax is the purified wax obtained from honeycomb of hive bee, Apis mellifera Linn and other species of Apis, belonging to family Apidae.

Beeswax as an emulsifying agent of cosmetics provides elasticity, plasticity and increases skin adhesiveness. Due to its properties, it is a valuable ingredient in the manufacture of lipsticks, sticks, and creams.<sup>xi</sup>

Beeswax is a product which is made from the honeycomb of the honeybee and other bees.

Beeswax acts as a shield for our skin, defending us against threats from our surroundings like pollution, scorching sun or dry winter days, plus it can be highly recommendable due to its lack of pore-clogging ability hence promoting free access to air by our bodies, especially those that are susceptible to pimples.

Bees wax is can be used as base for the creams, it is stable and give good consistency to the cream.

Beeswax is anti-allergenic, anti-inflammatory, anti-oxidant, anti-bacterial and germicidal.

beeswax give solidity to emulsified solutions and increase the water holding capacity of ointments and creams.

#### **5.5. Borax:**

Borax is a mineral that contains boron element, sodium, oxygen, and water naturally. In cosmetic products such as cream, borax is use as emulsifier buffering agent, or preservative. Borax provides good stability to cream.

Borax is also useful for to reduce bacterial growth in creams and other products.

### 5.6. Methyl Paraben

Methyl paraben is a 4-hydroxybenzoate ester resulting from the formal condensation of the carboxyl group of 4-hydroxybenzoic acid with methanol.

It is a preservative which can be used in different kinds of formulations.

In this multipurpose cream methyl paraben is used as a preservative, in small amount.

#### Formula:

| Sr. no. | Ingredients      | Quantity taken |
|---------|------------------|----------------|
| 1       | Bhimseni Camphor | 1g             |
| 2       | Sulphur          | 1g             |
| 3       | Coconut oil      | 3ml            |
| 4       | Bees wax         | 4g             |
| 5       | Methyl Paraben   | q.s.           |
| 6       | Borax            | 1g             |
| 7       | distilled water  | q.s.           |

#### 6. Procedure:

1. Heat beeswax and coconut oil in a China dish at 70-75°C and maintain that heating temperature (oil phase).
2. In another beaker, dissolve borax, methyl paraben, in distilled water and heat this beaker to 70°C to dissolve borax and methyl paraben and to get a clear solution. (aq. phase).
3. The slowly add this aq. phase to heated oily phase. Then add camphor and sulphur to the solution and stir vigorously until it forms a smooth cream.

#### 7. Evaluation parameters:

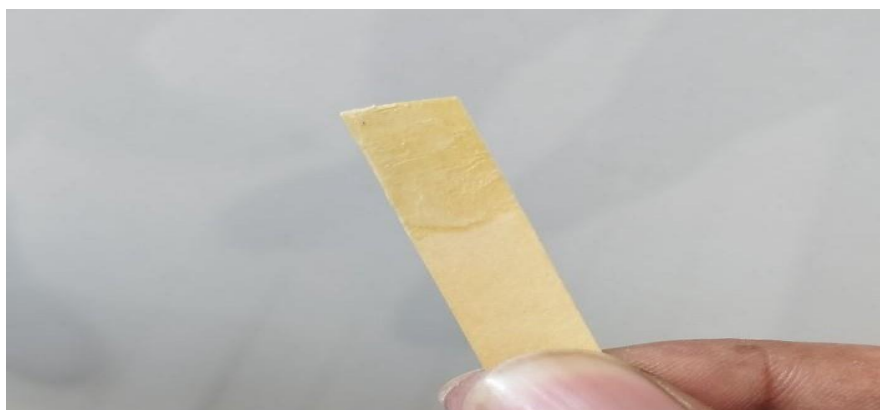
7.1 Physical Properties: The Cream was observed for colour, odour and physical appearance.

|            |                |
|------------|----------------|
| colour     | yellow         |
| odour      | characteristic |
| Appearance | Semi-Solid     |

#### 7.2 Determination of pH:

pH of Cream as Determined by pH Paper

PH of the cream found to be in range of 5.1 – 6. Which is good for skin pH



*figure 4.ph paper*

### 7.3 Washability:

The cream was applied on the hand and observed under the running water.<sup>xii</sup>

The cream was applied on hand and cream was easily removed by tap water, so according to this cream is easily passed this test.

### 7.4 Irritancy test:

Apply the cream on the left-hand dorsal surface and time was noted. Irritancy, erythema, edema, was checked for regular intervals for 24 hours.



*figure 5. irritancy test*

### 7.5 Stability studies:

Stability testing of drug products begins as a part of drug discovery and ends with the demise of the compound or commercial product. To assess the drug and formulation stability, stability studies were done.<sup>iii</sup>

| Test                 | After one month   |
|----------------------|-------------------|
| Physical appearance  | Semi-solid        |
| Texture              | Smooth and creamy |
| Colour               | Pale yellow       |
| Odour                | Characteristic    |
| Degradation of Cream | No                |

## 8. Result and discussion:

A majority of the world's population in developing countries still relies on herbal medicine to meet its health needs and because of this extensive research is now being carried out in this area.<sup>iii</sup>

- The pH of the prepared cream was found to be between 5.1-6 which is suitable for topical application because the pH of the skin is between 4.5– 6.
- cream is easily washable with tap water so it as good was ability.
- Cream was applied on hand overnight, and cream shown no Irritancy, erythema, edema, redness and inflammation during studies so cream is safe to use.
- Cream stability studies various factor like physical appearance texture colour odour degradation shown that that cream is stable.

## 9. Conclusion:

The present work shows the potential of bhimseni camphor and sulphur against different skin infections such as scabies, eczema and ringworm. The prepared formulation shown good consistency, stability and effect as well. Cream was evaluated and successfully passed all the test. Cream is safe to use it shown no irritation and inflammation when applied on skin.



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