

# Formulation and Evaluation of Anti - Bacterial Ointment Using Herbal Extracts

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**Abstract-** Herbal antibacterial ointments are widely used for the treatment of skin infections, cuts, wounds, burns, and microbial diseases because of their natural origin, safety, and therapeutic effectiveness. The present study focuses on the formulation and evaluation of an antibacterial ointment using herbal extracts such as garlic skin extract, rice husk extract, banana leaf extract, and peanut oil extract. These plant materials contain bioactive compounds like flavonoids, phenolics, tannins, sulfur compounds, and antioxidants that exhibit significant antibacterial activity against pathogenic microorganisms. The ointment was prepared by incorporating the herbal extracts into an ointment base using the fusion method. The prepared formulation was evaluated for various physicochemical parameters including color, odor, consistency, pH, spreadability, homogeneity, washability, viscosity, and stability. Antibacterial activity was evaluated by agar well diffusion method against selected bacterial strains such as *Staphylococcus aureus* and *Escherichia coli*. The formulation showed good appearance, smooth texture, acceptable pH, and satisfactory spreadability with no signs of irritation. The antibacterial study indicated effective inhibition of bacterial growth due to the presence of active phytoconstituents in the extracts. The study concludes that the formulated herbal antibacterial ointment possesses promising antibacterial activity and can be used as a safe and effective topical preparation for the management of minor skin infections and wounds.

## I. INTRODUCTION

Bacteria are living things with only a single cell that can reproduce quickly. There are millions of bacteria that live all around us - in soil or water and on surfaces in our homes and workplaces. There are even millions of bacteria that live on your skin and inside of your body. Most bacteria aren't harmful, and many are even helpful. They can help you digest food and kill off other harmful forms of bacteria that try to invade your body. But even the helpful ones can hurt you if they grow where they're not supposed to. Bacterial infections are any illness or condition caused by bacterial growth or poisons (toxins). You can get sick from getting harmful bacteria in your skin, gut (GI tract), lungs, heart, brain, blood or anywhere else in your body. Harmful bacteria from the environment, an infected person or animal, a bug bite or something contaminated (like food, water or surfaces) can

cause infections. Bacteria that's not normally harmful but that gets into a place in your body where it shouldn't be can also cause infections

Skin serves as the first line of defense of the human body against external injuries and microbial infections. Any damage to the skin due to cuts, burns, or abrasions leads to the formation of wounds, which require a proper healing process to restore normal tissue structure and function. Wound healing is a complex biological process involving inflammation, tissue formation, and remodeling. However, the presence of microorganisms at the wound site can delay healing and increase the risk of infection. Conventional wound treatment methods mainly rely on synthetic antimicrobial agents, which may cause side effects such as skin irritation and microbial resistance after prolonged use. This has increased the demand for natural and plant-based alternatives for wound management. Medicinal plants contain bioactive compounds like flavonoids, tannins, and phenolic substances that exhibit antimicrobial, antioxidant, and anti-inflammatory properties essential for faster tissue regeneration.

Apart from their ability to fight off harmful microorganisms, peanut peels also have a lot of nutritional value. They are rich in dietary fiber, protein, carbohydrates, fats, vitamins, and minerals, and their high phenolic content and antioxidant capacity make them a valuable nutritional by-product. These nutritional attributes, coupled with documented health benefits, position peanut peels as promising sources of natural antimicrobial agents and other health-promoting products.<sup>2</sup> Recently, the medicinal properties of the outer peel of peanuts are being explored due to the bioactive compounds they contain, which have antimicrobial properties as acknowledged in various studies.<sup>2-4</sup> Others have also indicated that peanut peel extracts may combat common pathogens such as *E. coli* and *S. aureus*. Peanut peel has several potential pharmacological properties ranging from antioxidants, anti-inflammatory, anti-bacterial, anti-viral, anti-fungal, anti-cancer and anti-cardiovascular among others

Garlic extract inhibits the growth of Gram positive and Gram negative bacteria, such as *Staphylococcus*, *Streptococcus*, *Micrococcus*, *Enterobacter*, *Escherichia*, *Klebsiella*, *Lactobacillus*, *Pseudomonas*, *Shigella*, *Salmonella*, *Proteus*, and *Helicobacter pylori* <sup>4,5</sup>. Its antibacterial activity is mainly due to the presence of allicin produced by the

enzymatic activity of allinase on alliin. Allicin also makes garlic smell.

### Types of bacterial infections

Bacteria can cause many types of infections, depending on how you're exposed and what part of your body it infects. Some common types of bacterial infections include:

- Food poisoning ([gastroenteritis](#)).
- Some skin, [ear](#) or [sinus infections](#).
- Some [sexually transmitted infections \(STIs\)](#).
- Bacterial [pneumonia](#).
- Most [urinary tract infections \(UTIs\)](#).

### Uses of Antibacterial Ointment

- Prevention of bacterial skin infections
- Treatment of cuts, wounds, burns and ulcers
- Reducing redness, swelling and pus formation
- Faster wound healing
- Protection against bacteria like *Staphylococcus aureus* and *E. coli*

### Common Herbal Ingredients Used

- Garlic extract
- Peanuts extract
- Banana leaves extract
- Rice husk extract

### Treatment

Antibacterial ointments are applied externally on:

- Minor cuts and injuries
- Skin infections
- Burn wounds
- Surgical wounds
- Diabetic ulcers

## II. LITERATURE SURVEY

**Table no. 1 Literature Survey**

| Sr. No | AUTHOR NAME                | TITLE                                                        | DETAILS                                                                                                                                      |
|--------|----------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | K. Ashwini et al. (2021)   | Formulation and evaluation of herbal antibacterial ointment  | Prepared herbal ointment using plant extracts and evaluated antibacterial activity against <i>Staphylococcus aureus</i> and <i>E. coli</i> . |
| 2      | P. Patil et al. (2020)     | Evaluation of antibacterial activity of herbal ointment      | Study showed good spreadability, stability and antimicrobial action of herbal formulation.                                                   |
| 3      | S. Sharma et al. (2019)    | Herbal ointment containing garlic extract                    | Garlic extract showed strong antibacterial activity due to allicin compound.                                                                 |
| 4      | R. Singh et al. (2018)     | Phytochemical screening of medicinal plants                  | Presence of flavonoids, tannins and saponins responsible for antibacterial activity.                                                         |
| 5      | M. Kaur et al. (2017)      | Formulation and evaluation of topical antibacterial ointment | Ointment formulation showed good homogeneity, pH and skin compatibility.                                                                     |
| 6      | A. Verma et al. (2016)     | Antimicrobial activity of banana leaf extract                | Banana leaves extract exhibited antibacterial and wound healing properties due to phenolic compounds and flavonoids.                         |
| 7      | S. Rao et al. (2015)       | Rice husk extract in herbal formulation                      | Rice husk extract showed antioxidant and antimicrobial activity useful in topical preparations.                                              |
| 8      | S. Rao et al. (2015)       | Rice husk extract in herbal formulation                      | Rice husk extract showed antioxidant and antimicrobial activity useful in topical preparations.                                              |
| 9      | D. Kumar et al. (2013)     | Phytochemical analysis of peanut peel and oil                | Peanut peel and oil contained polyphenols, resveratrol and antioxidants responsible for antimicrobial activity.                              |
| 10     | B.N. Suhagia et al. (2011) | Phytochemical constituents of medicinal plants               | Isolation of flavonoids, tannins and triterpenoids from herbal extracts useful in antibacterial ointments.                                   |

## III. AIM & OBJECTIVE

To Formulation And Evaluation Of Anti- Bacterial Ointment Using Herbal Extract.

### OBJECTIVE

- To prepare extracts from garlic skin, peanut ,rice peel and banana leaves.
- To formulate an ointment using these Herbal extracts.
- To evaluate the physical properties and chemical properties of the ointment (color, odor, consistency, pH).
- To assess antibacterial activity against selected microorganisms.
- To compare the effectiveness of the formulation with marketed anti-bacterial product .

#### IV. PLAN OF WORK

- Literature review on antibacterial activity and current treatment.
- Literature review on herbal plants for antibacterial activity.
- Extraction process of garlic skin, rice peels, banana leaves, peanuts.
- Phytochemical screening and characterization.
- Formulation antibacterial herbal ointment.
- Evaluation of antibacterial herbal ointment .

#### V. PLANT AND EXICIPENT PROFILE

##### Plant Profile

##### • Garlic Skin

- **Synonyms :** Garlic peel , Garlic husk, Outer covering of garlic bulb , Allium sativum skin
- **Biological Source:** Garlic skin is obtained from the dried outer covering (peel) of the bulb of Allium sativum.
- **Family:** Amaryllidaceae (Previously classified under Liliaceae)
- **Constituents:** Allicin , Alliin Flavonoids, Phenolic compounds, Sulfur-containing compounds ,Tannins Saponins Antioxidants
- **Properties:** Antibacterial property, Antifungal property ,Antioxidant property ,Anti-inflammatory property , Wound healing activity, Antimicrobial activity
- **Uses:** Used in preparation of herbal antibacterial ointments, Helps in wound healing, Prevents bacterial infection on skin, Used in cosmetic and herbal formulations, Used as natural antioxidant source, Applied in pharmaceutical research formulations



Fig No 1 : Garlic Skin

##### Rice Skin

- **Synonyms:** Rice husk, Rice hull, Rice bran covering, Paddy husk, Rice skin extract
- **Biological Source:** Rice husk is the outer protective covering obtained from the grains of Oryza sativa after milling and processing of rice.
- **Family:** Poaceae (Gramineae)
- **Chemical Constituents:** Rice husk contains:, Silica, Cellulose, Hemicellulose, Lignin, Phenolic compounds, Flavonoids, Antioxidants, Vitamins and minerals, Fatty acids (small amount)
- **Properties:** Antibacterial property, Antioxidant activity, Anti-inflammatory property, Wound healing activity, Moisture absorbing property, Protective and soothing action on skin
- **Uses :**  
Used in herbal antibacterial ointments, Used in wound healing preparations, Used in cosmetic creams and scrubs, Helps protect skin from microbial infection, Used as a natural antioxidant source, Used in pharmaceutical and cosmetic formulations



Fig No.2: Rice Skin

##### Banana Leaves

- **Synonyms:** Banana leaf, Plantain leaf, Kela leaf (Hindi/Marathi common name), Musa leaf
- **Biological Source :** Banana leaves are obtained from the plant *Musa paradisiaca* and other species of the genus *Musa*. The leaves are collected from mature banana plants and used for medicinal, nutritional, and pharmaceutical purposes.
- **Family:** Musaceae
- **Constituents:** Banana leaves contain several useful phytochemicals and nutrients such as: Polyphenols, Flavonoids, Tannins, Saponins, Alkaloids, Glycosides, Antioxidants, Chlorophyll, Vitamins and minerals
- **Properties:** Banana leaves show different medicinal properties: Antibacterial property, Antioxidant activity, Anti-inflammatory property, Wound healing activity, Cooling and soothing effect, Antimicrobial action
- **Uses :** Used in preparation of herbal ointments and creams, Used for wound healing applications, Helps prevent bacterial infection, Used as natural food wrapping material, Used in traditional medicine systems, Used in cosmetic and herbal formulations, Used for treating minor burns and skin irritation



Fig No.3: Banana Leaves

### Peanuts Peels

- **Synonyms:** Banana leaf, Plantain leaf, Kela leaf (Hindi/Marathi common name), Musa leaf
- **Biological Source:** Banana leaves are obtained from the plant *Musa paradisiaca* and other species of the genus *Musa*.

The leaves are collected from mature banana plants and used for medicinal, nutritional, and pharmaceutical purposes.

- **Family:** Musaceae
- **Constituents:** Banana leaves contain several useful phytochemicals and nutrients such as: Polyphenols,

Flavonoids, Tannins, Saponins, Alkaloids, Glycosides, Antioxidants, Chlorophyll, Vitamins and minerals

- **Properties:** Banana leaves show different medicinal properties:

Antibacterial property, Antioxidant activity, Anti-inflammatory property, Wound healing activity, Cooling and soothing effect, Antimicrobial action

- **Uses :** Used in preparation of herbal ointments and creams, Used for wound healing applications, Helps prevent bacterial infection, Used as natural food wrapping material, Used in traditional medicine systems, Used in cosmetic and herbal formulations, Used for treating minor burns and skin irritation



Fig No 4 : Peanuts Peel

### Excipient Profile

- **White Soft Paraffin:** Acts as the ointment base, providing smooth texture, occlusive properties, and prolonged contact of garlic extract with the skin for better therapeutic action.
- **Beeswax:** Used as a stiffening agent that improves the consistency and stability of the ointment while enhancing spreadability.
- **Liquid Paraffin:** Functions as an emollient and lubricant, helping to soften the skin and improve the ease of application of the ointment.
- **Cetostearyl Alcohol:** Acts as an emulsifying and stabilizing agent that enhances the texture and viscosity of the ointment formulation.
- **Propylene Glycol:** A humectant that retains moisture in the skin and improves the penetration of garlic extract into the affected area.

**Methyl Paraben & Propyl Paraben:** Used as preservatives to prevent microbial contamination and increase the shelf life of the herbal ointment.

- **EDTA:** A chelating agent that binds metal ions and enhances the stability of the formulation by preventing degradation of active constituents.

- **Distilled Water:** Serves as the aqueous phase of the ointment formulation and helps dissolve water-soluble ingredients uniformly.
- **Triethanolamine (TEA):** Used for pH adjustment and stabilization of the formulation to maintain skin compatibility and product consistency.

## VI. EXPERIMENTAL WORK

### Extraction Process (Garlic Skin Extract)

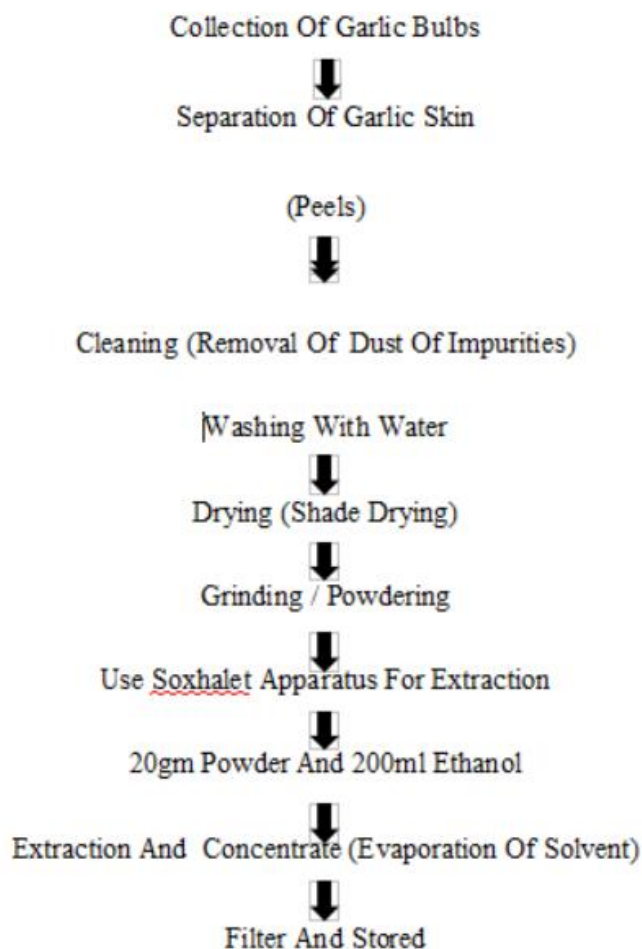
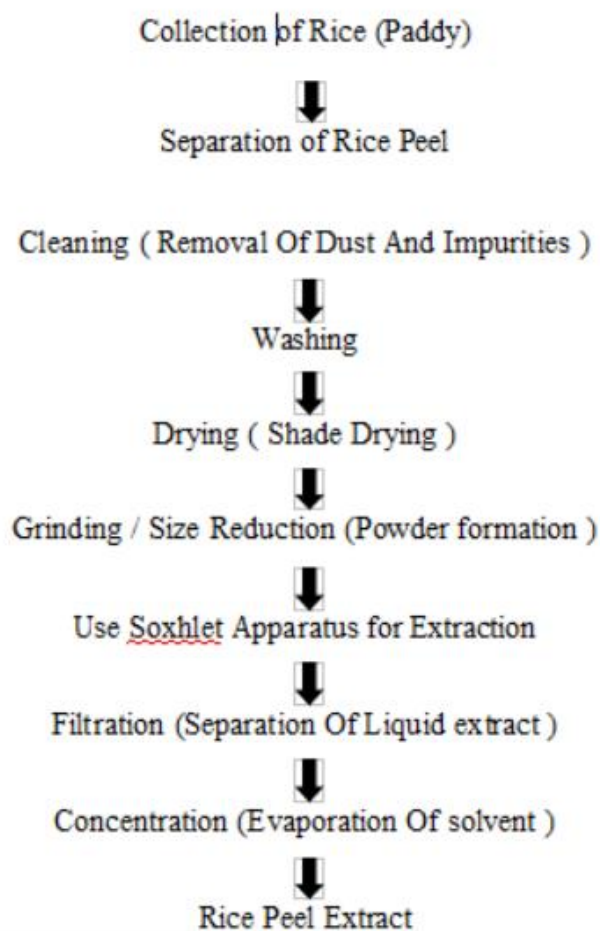


Fig No.6: Extraction Process Of Rice Skin Extract

### Extraction Process (Rice Skin Extract)



### Extraction Process Of (Banana Leaves Extract)

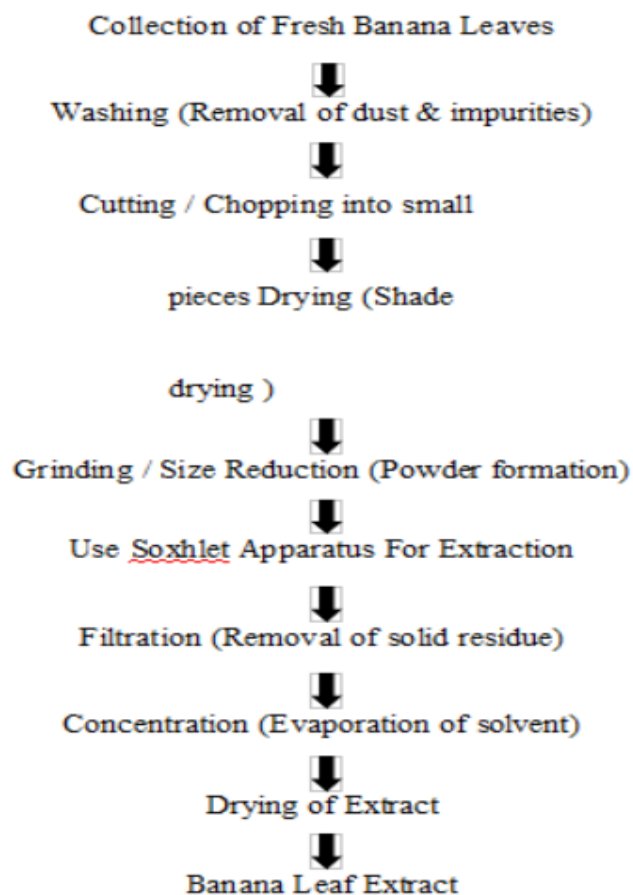


Fig. No7: Extraction Process of banana Leaves extract

Extraction Process Of ( Peanuts Oil Extract)

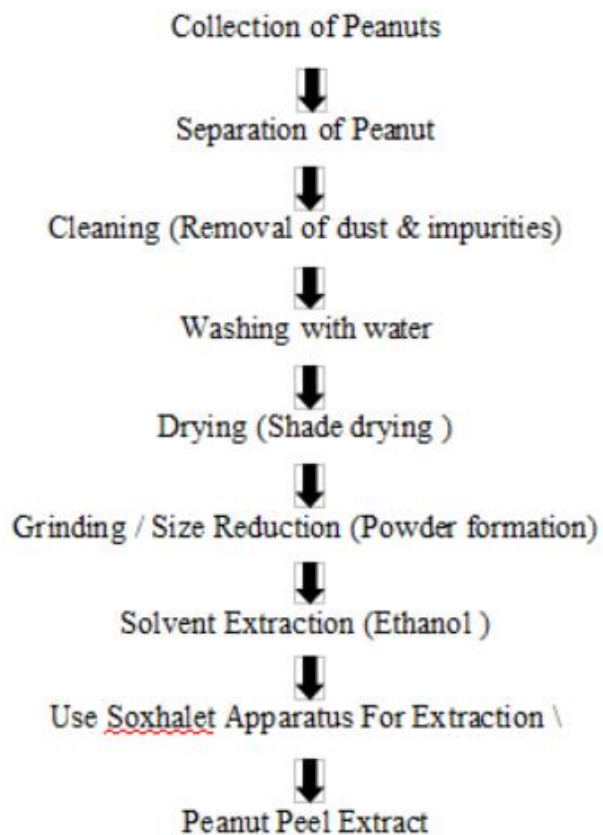
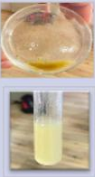


Fig No 8: Extraction Process of banana Peanuts extract

Characterisation Of Herbal Extract

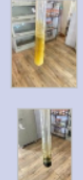
Phytochemical Analysis (Garlic skin extract )

| Sr. No. | TEST                                                             | OBSERVATION                        | RESULT             | IMAGE                                                                             |
|---------|------------------------------------------------------------------|------------------------------------|--------------------|-----------------------------------------------------------------------------------|
| 1.      | <b>Test of flavonoids :</b><br>➤ NaOH + Sample<br>➤ HCL + Sample | Yellow colour<br>Colour disappears | Present<br>Present |  |
| 2.      | <b>Test of phenols :</b><br>➤ Ferric chloride + Sample           | Blue/green colour                  | Absence            |  |
| 3.      | <b>Test of alkaloids :</b><br>➤ Dragendorff's + Sample           | Orange colour                      | Absence            |  |
| 4.      | <b>Test of Saponin :</b><br>➤ Water + Sample                     | Foam Formation                     | Present            |  |

#### Phytochemical Analysis (Rice skin extract )

| Sr. No. | Test                                                   | Observation        | Result  | Image                                                                               |
|---------|--------------------------------------------------------|--------------------|---------|-------------------------------------------------------------------------------------|
| 1.      | <b>Test of phenols :</b><br>➤ Ferric chloride + Sample | Dark colour appear | Present |  |
| 2.      | <b>Test of alkaloids :</b><br>➤ Dragendorff's + Sample | Orange colour      | Present |  |
| 3.      | <b>Test of Saponin :</b><br>➤ Water + Sample           | Foam Formation     | Present |  |

#### Phytochemical Analysis (Banana leaves extract )

| Sr. No. | Test                                                               | Observation                  | Result             | Image                                                                               |
|---------|--------------------------------------------------------------------|------------------------------|--------------------|-------------------------------------------------------------------------------------|
| 1.      | <b>Solubility</b><br>➤ Sample + Water<br>Sample + Ethanol          | Slightly soluble<br>Soluble  | Present<br>Present |  |
| 2.      | <b>Saponin</b><br>➤ Sample + Water                                 | No Foam                      | Absence            |  |
| 3.      | <b>Tannin</b><br>Sample + Lead acetate<br>Sample + Ferric Chloride | White ppt<br>Blackish colour | Absence<br>Present |  |

#### 6.1.1.4 PHYTOCHEMICAL ANALYSIS (Peanuts Oil extract )

##### OREGANOLEPTIC EVALUATION

| PARAMETER  | OBSERVATION                  |
|------------|------------------------------|
| Colour     | Pale Yellow To Golden Yellow |
| Odour      | Characteristic Nutty Odour   |
| Appearance | Clear Oily Liquid            |
| Texture    | Smooth And Oily              |

##### pH DETERMINATION

- Prepare 1% solution/emulsion of peanut oil extract in distilled water.
- Measure using digital pH meter. Expected pH: 5.5 – 7.0

##### SPECIFIC GRAVITY TEST

1. Water = 50.37 – 23.76 = 26.61
  2. Oil = 47.33 – 23.76 = 23.57
- Pycometer = 23.76

Formula =  $\frac{\text{Weight Of Oil}}{\text{Weight Of Water}}$

= 23. 57

26.21

##### SOLUBILITY TEST (PEANUTS OIL EXTRACT )

| Sr. No. | Test                            | Observation      | Result  | Image                                                                             |
|---------|---------------------------------|------------------|---------|-----------------------------------------------------------------------------------|
| 1.      | Solubility<br>Sample +<br>Water | Insoluble        | Present |  |
| 2.      | ➤ Sample +<br>Ethanol           | Slightly Soluble | Present |  |
| 3.      | ➤ Sample +<br>chloroform        | soluble          | Present |  |

Calibrate the pH meter with standard buffer solution if required. Dip the electrode of the pH meter into the ointment dispersion. Record the pH value shown on the display.

Repeat the test three times and calculate the average pH

### Solubility Test

Check solubility of extract in: Water, Ethanol ,Methanol ,Acetone Purpose: To select suitable solvent for ointment formulation.

### Moisture Content

Used to determine water content present in extract.

### PHYTOCHEMICAL ANALYSIS (Peanuts Oil Extract )

| Sr. No. | Test                                   | Observation                              | Result  | Image                                                                               |
|---------|----------------------------------------|------------------------------------------|---------|-------------------------------------------------------------------------------------|
| 1.      | ➤ Alkaloid<br>Test<br>(Mayers<br>Test) | Cream or<br>white<br>precipitate<br>form | Present |    |
| 2.      | ➤ Flavonoids<br>Test                   | Yellow colours<br>appears                | Absent  |   |
| 3.      | ➤ Tannins<br>Test                      | Blue or Black<br>colour develops         | Present |  |
| 4.      | Saponins Test                          | Stable foam<br>formation                 | Present |  |

#### 1. Formula:

$$\text{MOISTURE CONTENT} = \frac{W_1 - W_2}{W_1} \times 100$$

Where,  $W_1$

$W_1$  = Initial weight

$W_2$  = Final dried weight

#### • Density

The density was obtained using the formula below.

#### 2. Formula:

$$\text{Density} = \text{Specific gravity} \times 1000 \text{ kg/m}^3$$

### 6.2 FORMULATION OF HERBAL OINTMENT

The Ointment Was Prepared Using Dried Methnolic Extract Of Garlic Skin , Rice Skin , Banana Leaves, Peanuts oil.

The ointment was prepared using dried extracts of garlic skin extract, rice husk extract, banana leaves extract and peanut oil. The formulation was prepared using soft paraffin, beeswax, liquid paraffin, methyl paraben, propyl paraben and distilled water to prepare 100 gm ointment. The required quantity of ointment base was divided into two parts. In one part, the calculated quantity of herbal extracts was dissolved with a small quantity of ethanol and peanut oil was added slowly with continuous stirring. In another part, soft paraffin, beeswax and liquid paraffin were melted together on water bath. Methyl paraben and propyl paraben were added as preservatives. Both phases were mixed slowly with continuous stirring until a uniform semisolid ointment was formed. The ointment was allowed to cool at room temperature and transferred into suitable sterile containers for further evaluation.

### PARAMETERS ANALYSIS OF GARLIC SKIN EXTRACT

- **Organoleptic Evaluation**  
Color, Odour , Appearance , Texture
- **PH Determination**

Take about 1 g of ointment in a beaker. Add 10 ml distilled water.

Stir properly using a glass rod to make a uniform dispersion. Allow the mixture to stand for 2–3 minutes.

**Table No2. Developed Herbal Ointment Formulation**

| Formulation Code           | F1  | F2  | F3  |
|----------------------------|-----|-----|-----|
| Garlic skin extract(gm)    | 2   | 3   | 4   |
| Banana leaves extract (gm) | 2   | 3   | 4   |
| Rice husk extract (gm)     | 2   | 3   | 4   |
| Peanut oil (ml)            | 5   | 7   | 10  |
| Beeswax                    | 8   | 10  | 12  |
| Soft paraffin(gm)          | 45  | 40  | 35  |
| Liquid paraffin(ml)        | 20  | 18  | 15  |
| Methyl paraben(gm)         | 0.2 | 0.2 | 0.2 |
| Propyl paraben(gm)         | 0.2 | 0.2 | 0.2 |
| Distilled water            | 9.5 | 9.5 | 9.5 |

### 6.3 EVALUATION OF HERBAL OINTMENT

➤ **Physical evaluation** : Physical parameters such as colour, appearance, consistency and feel were checked.

➤ **Colour** : The colour of the formulations was checked visually against a white background.

➤ **Consistency** : The consistency was checked by applying the ointment on the skin.

➤ **Greasiness** : The greasiness was assessed by application of the ointment onto the skin.

➤ **Odour**: The odour of the ointment was checked by smelling the formulation.

➤ **pH**: The pH values of 1% aqueous solutions of the prepared antibacterial ointment containing were measured using a digital pH meter.

#### ➤ Viscosity

The viscosity of the ointment formulations was determined using Brookfield viscometer with spindle no. 4 at 10 rpm.

#### ➤ Appearance and Homogeneity:

The appearance and homogeneity were determined through visual inspection. The ointment was checked for uniformity and absence of lumps.

#### ➤ Uniformity of Drug Content:

Drug content of the ointment was measured by dissolving accurately weighed 1 g ointment in suitable solvent or phosphate buffer pH 7.4.

After appropriate dilution, absorbance was measured using UV-Visible spectrophotometer.

#### ➤ Spread ability

In this method, slip and drag characteristics of ointment were involved. Formulated ointment (2 g) was placed on the ground slide under study. The ointment was placed between two glass slides and compressed to provide a uniform film between slides.

The upper slide was subjected to pull with the help of a certain weight attached through a string. The time required by the upper slide to move a fixed distance was noted.

A shorter interval indicated better spreadability. Formula used for spreadability:  $S = \frac{M \times L}{T}$

Where,

- S = Spreadability
- M = Weight tied to the upper slide
- L = Length moved by the glass slide
- T = Time taken to separate the slides

#### ➤ Washability Test

The washability test was determined by applying a small amount of prepared ointment over the skin and washing it with warm water. The formulation should possess good washability.

#### ➤ Extrudability

The extrudability of the ointment was determined by pressing the tube and measuring the amount of ointment extruded from the collapsible tube. The formulation should show good extrudability.

#### ➤ Stability Study

The formulated antibacterial ointment was subjected to stability studies at room temperature and accelerated conditions. The formulations were observed for changes in colour, odour, pH and consistency during the storage period.

#### ➤ Microbial Growth Study

Nutrient agar media was used for microbial growth study. The ointment samples were aseptically transferred onto Petri plates and incubated. The microbial growth was observed for a specified period.

#### ➤ Determination of Moisture Content and Volatile Matter

About 5 g of formulation was placed in a porcelain dish and dried in an oven at 105°C until constant weight was obtained.

Formula used for moisture content:

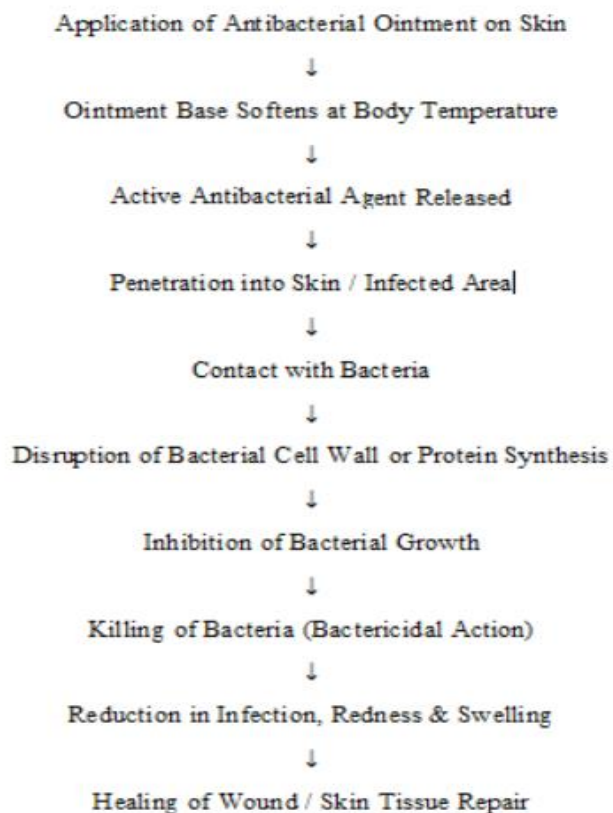
$\% \text{Moisture Content} = \frac{\text{Loss of Mass}}{\text{Initial Mass}} \times 100$  Where,

- Loss of Mass = Difference in weight before and after drying
- Initial Mass = Weight of sample taken for test
- Ingredients Used in Antibacterial Ointment
- Garlic skin extract
- Rice skin extract
- Banana leaves extract
- Peanut oil
- Ointment base / excipients as required

## VII. SAMPLE LABELING

|                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Rx</p> <p><b>BrandName</b></p> <p>T-BactOintment</p> <p>Mupirocin 2%w/w</p> <p>NetQuantity: 1 Tube (5)g</p>                                                                                                                                                | <p>One Tube Contains: 5 Mupirocin 2%w/w MFG.</p> <p>DATE: 08/2024</p> <p>EXP. DATE: 07/2027</p> <p>M.R.P. ₹: 108.36 (incl. of all taxes)</p> <p>DOSAGE: As directed by physician</p> <p>NET QTY: 5 g</p> <p>STORAGE: Store below 25°C. Protect from sunlight.</p>                                                                                                                                                                                                                                                                                   |
| <p>Rx</p> <p><b>BrandName</b></p> <p>Herbal Antibacterial Ointment</p> <p>(Garlic Skin Extract, Banana Leaves Extract, Peanuts Oil Extract, Rice Husk Extract)</p> <p>20mg/g</p> <p>Rx only</p> <p>For External Use Only</p> <p>NetQuantity: 1 Tube (15g)</p> | <p>One tube contains:</p> <p>Garlic Skin Extract – 15 mg</p> <p>Banana Leaves Extract – 10mg</p> <p>Peanuts Oil Extract – 12 mg</p> <p>Rice Husk Extract – 8 mg</p> <p>Uses: Antibacterial Herbal Ointment</p> <p>Storage: Store at room temperature (25°C) Keep away from direct sunlight and moisture.</p> <p>Dosage: Apply on affected areas as directed by physician.</p> <p>MRPRs: 150/-</p> <p>Batch No: HAO-10025 Mfg. Date: 10/05/2025 Exp. Date: 10/05/2027</p> <p>Manufactured by: ABC Pharma Lab</p> <p>Marketed by: XYZ Herbal Care</p> |

## VIII. MECHANISM OF ACTION



## IX. RESULT AND DISCUSSION

## 9.1. Phytochemical analysis of Herbal Extract

Table No3 Phytochemical Analysis Of Extract

| Sr. No. | Class Of Compounds | Result   |
|---------|--------------------|----------|
| 1       | Saponins           | Positive |
| 2       | Flavonoids         | Positive |
| 3       | Glycosides         | Positive |
| 4       | Terpenoids         | Positive |
| 5       | Carbohydrates      | Negative |
| 6       | Tannins            | Positive |
| 7       | Phenolics          | Positive |
| 8       | Alkaloids          | Negative |

## Formulation and Development of Herbal Ointment

Table No.4 Composition of Formulation

| Sr. No | Ingredients           | Quantity    |
|--------|-----------------------|-------------|
| 1      | Garlic Skin Extract   | 3 gm        |
| 2      | Rice Husk Extract     | 2 gm        |
| 3      | Banana Leaves Extract | 2 gm        |
| 4      | Peanut Oil Extract    | 5 ml        |
| 5      | Bees Wax              | 8 gm        |
| 6      | Petroleum Jelly       | 25 gm       |
| 7      | Liquid Paraffin       | 10 ml       |
| 8      | Borax                 | 0.5 gm      |
| 9      | Methyl Paraben        | 0.02 gm     |
| 10     | Distilled Water       | upto 100 gm |

## Physical evaluation of Herbal Ointment

Table No.5 Physical Evaluation

| Sr. No | Parameter   | Result                      |
|--------|-------------|-----------------------------|
| 1      | Colour      | Light Brown                 |
| 2      | Odour       | Characteristic Herbal Odour |
| 3      | Consistency | Smooth and Homogeneous      |
| 4      | Greasiness  | Non-greasy                  |
| 5      | Texture     | Soft                        |
| 6      | Appearance  | Uniform                     |

## Evaluation Parameters

Table No.6 : Evaluation Parameter

| Sr. No | Parameter            | Result          |
|--------|----------------------|-----------------|
| 1      | Spreadability        | 7.5 cm          |
| 2      | Washability          | Easily Washable |
| 3      | pH                   | 6.8             |
| 4      | Homogeneity          | Good            |
| 5      | Skin Irritation Test | No Irritation   |
| 6      | Stability            | Stable          |

## 9.5. Microbiological Content tes

**Table No.7 Antibacterial Activity**

| Sr. No | Methods                                     | Result             |
|--------|---------------------------------------------|--------------------|
| 1      | Positive Control (Bacteria + Nutrient Agar) | Growth Observed    |
| 2      | Negative Control (Nutrient Agar)            | No Growth          |
| 3      | Herbal Ointment Sample                      | No Growth Observed |

## X. FUTURE SCOPE

- Herbal antibacterial ointment can be further developed into creams, gels, sprays, and medicated patches for better patient convenience.
- Advanced extraction and formulation techniques can improve the stability, effectiveness, and shelf life of the ointment.
- Further clinical and microbiological studies can be carried out to confirm safety and antibacterial activity on a large scale.
- The formulation may help reduce antibiotic resistance caused by excessive use of synthetic antibacterial drugs.
- Large-scale production of herbal ointments can promote eco-friendly, natural, and cost-effective medicinal products.
- The ointment has future applications in wound healing, skincare products, cosmetic preparations, and pharmaceutical industries.

## XI. CONCLUSION

The present study concluded that the formulated herbal antibacterial ointment containing garlic skin extract, banana leaves extract, peanut oil extract and rice husk extract showed significant antibacterial activity against pathogenic microorganisms. The herbal extracts possessed good phytochemical constituents such as flavonoids, tannins, phenolic compounds and antioxidants responsible for antimicrobial action. The prepared ointment F2 batch showed satisfactory physicochemical properties including good appearance, homogeneity, spreadability, consistency and stability. The pH of the formulation was found to be suitable for skin application without causing irritation. Garlic skin extract exhibited strong antibacterial activity due to sulfur compounds and allicin content. Banana leaves extract contributed wound healing and anti-inflammatory properties. Peanut oil improved emollient property and enhanced skin absorption of the formulation. Rice husk extract provided antioxidant and protective effects because of its phenolic

constituents. The formulation was found to be safe, stable and effective for topical use. Hence, the developed herbal antibacterial ointment can be considered as a promising natural alternative for treatment of minor skin infections and wound healing applications.

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