Formulation and Evaluation of Herbal Antimicrobial and Antibacterial Ointment

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Abstract:
The main goal of present research was to formulate and evaluate the antimicrobial ointment which was prepared from herbal plant. Herbal medicines has become a global important for both medical and economical. The antimicrobial ointment prepared from herbal plant are more efficacious than synthetic medicines and which shows some adverse effect. Although uses of herbal plants instead of systemic medicines which have ability to improve the quality, efficacy and safety of the ointment. This study investigated the antimicrobial activity of “Cinnamom cassia” (cinnamon), “Myristica fragrans” (Nutmeg), “Eugenia caryophyllus” (Clove) and “Zingiber officinale” (Ginger). The four plant which are selected for the preparation of wound healing and shows antimicrobial and antibacterial infections, Anti-inflammatory, Antiseptic activity.

Keywords: Antimicrobial Ointment, Formulation, Evaluation, Nutmeg, Ginger, Clove, cinnamon phytochemistry.

I. INTRODUCTION.

Ointments are semi-solid preparations meant for external application to skin or mucous membrane. They usually contain medicaments dissolved, suspended or emulsified in an ointment base. They may contain a suitable antimicrobial preservative. The ointments are mainly used as protective or emollient for the skin.[1]

1.1. Classification of Ointments:-

1) Unmediated Ointments: - These ointments do not contains any drugs. They are useful as emollients, Protect ants.

2) Medicated Ointments: - These ointment contains drugs which show local or systemic effects.

They are the several sub types

1. Dermatologic Ointment
2. Ophthalmic Ointment
3. Rectal Ointment
4. Vaginal Ointment
5. Nasal Ointment

1.2 Ointment classified according to properties based on penetration:-

1. Epidermic Ointments:-
These Ointments are meant for action on epidermis and produce local effect.

2. Endodermic Ointments:-
These Ointments are meant for action on deeper layers of cutaneous tissues.

3. Diadermic Ointments:- These ointments are meant for action on deep penetration and release the medicaments that pass through the skin and produce systemic effects.

1.3 Ointment classified according to therapeutic uses:-

1. Antibiotic Ointments: -These ointments are used to kill microorganisms.

2. Antifungal Ointments: -These ointments are used to relieve the inflammatory, allergic and pruritic condition of skin.

3. Counter Irritant Ointments: -These ointments are applied locally to irritate the skin.

4. Protectant Ointments: -These ointments protect the skin from moisture, air, sun rays or other substance such as sopa or calamine, Zinc oxide, silicones, titanium dioxide etc.

1.4 Classification of Ointment Bases:-[2]

1. Oleaginous bases
2. Absorption base
3. Emulsion bases
4. Water soluble bases

II. OBJECTIVES

1. To formulate antimicrobial and antibacterial ointment for wound healing activity by using ingredients such as Cinnamon, Nutmeg, Clove and Ginger.

2. Evaluation of herbal wound healing Ointment such as Appearance, consistency, spread ability, pH, skin irritation test and antimicrobial activity against gram positive, gram negative bacteria’s.
<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Common Name</th>
<th>Figure</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cinnamon</td>
<td><img src="image1.png" alt="Cinnamon" /></td>
<td>Flavouring agents, aromatic Dental analgesic and local antiseptic</td>
</tr>
<tr>
<td>2</td>
<td>Nutmeg</td>
<td><img src="image2.png" alt="Nutmeg" /></td>
<td>Aromatic stimulants, antimicrobial, wound healing activity and anti-inflammatory</td>
</tr>
<tr>
<td>3</td>
<td>Ginger</td>
<td><img src="image3.png" alt="Ginger" /></td>
<td>Stimulants, Antiseptic as well as Antimicrobial agent</td>
</tr>
<tr>
<td>4</td>
<td>Clove</td>
<td><img src="image4.png" alt="Clove" /></td>
<td>Dental analgesic, stimulant, flavouring agent, antiseptic and antimicrobial agent</td>
</tr>
<tr>
<td>4</td>
<td>Stearic acid</td>
<td><img src="image5.png" alt="Stearic acid" /></td>
<td>Emulsifier,lubricant, Effective stabilizer, Helps to create cooling sensation.</td>
</tr>
<tr>
<td>5</td>
<td>Cetosteryl alcohol</td>
<td><img src="image6.png" alt="Cetosteryl alcohol" /></td>
<td>Moisturizer to treat or prevent dry, rough, scaly, minor skin irritation, emollient.</td>
</tr>
</tbody>
</table>
III. MATERIALS AND METHODS

A) Preparation of Plant Extract : [4-7]

The extract was prepared by simple maceration. Firstly we were take 20 gm of each leaves of plants such as cinnamon, Nutmeg, Ginger, and Clove. They were dried pulverized in air, and then they were soaked with 200ml of water for 48hr. After 24hr solvent was decanted and the residue again soaked with the same solvent for 24hr. The total extract was combined and filter then the evaporation of solvent was done on heating mental this was dried and stored in desiccators for further use.

B) Preparation of ointment: [8]

The wound healing or antimicrobial ointments were formulated by using fusion method. In that firstly we were prepared ointment base by mixing oil phase and aqueous phase and then the herbal drug was mixed.

i. Preparation of ointment base:

For the preparation of ointment base first weigh required quantity of stearic acid, cetostearyl alcohol, hard paraffin and yellow soft paraffin in china dish they were melted on water bath at 75°C- 78°C.

In another china dish take required quantity of reaming ingredient they were dissolve in water bath and melted at 76°C. The aqueous solution then was added to the oily phase with constant stirring. Finally ointment were filled in suitable plastic container.

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Ingredient</th>
<th>Quantity (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cinnamon</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>Nutmeg</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>Ginger</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>Clove</td>
<td>0.5</td>
</tr>
<tr>
<td>5</td>
<td>Stearic acid</td>
<td>1.5</td>
</tr>
<tr>
<td>6</td>
<td>Cetostearyl alcohol</td>
<td>1.0</td>
</tr>
<tr>
<td>7</td>
<td>Wool fat</td>
<td>1.0</td>
</tr>
<tr>
<td>8</td>
<td>Hard paraffin</td>
<td>0.5</td>
</tr>
<tr>
<td>9</td>
<td>Yellow soft paraffin</td>
<td>6.0</td>
</tr>
</tbody>
</table>
ii. Formulation of ointment:

The wound healing ointment were formulated by mixing 0.5 gm of each the extract to the above prepared ointment base with continuous stirring by mechanical stirrer, finally filled ointment was into collapsible tube.

![Figure 1. Formulated Ointment](image1)

IV. PHARMACEUTICAL EVALUATION OF OINTMENT: [9]

The formulation were evaluate for different pharmaceutical parameter

A) Physical Appearance -

The formulated ointment were observed for their visual appearance, transparency, color, consistency.

**Appearance:** Semisolid in nature

**Color:** Dark reddish Brown

**Transparency:** Non-Transparency

**Consistency:** Smooth.

B) pH – [10-11]

The pH of formulated ointment were determined by using digital pH meter by dissolving 1gm ointment in 100ml of water.

![Figure 2. pH test](image2)

C. Consistency-

The consistency of formulated ointment were determined by hand. Take pinch of ointment and rubbed it with finger.

D. Spreadability – [8]

The spreadability of the formulated ointment were determined by 500mg of the ointment was sandwiched between two slides. A weight of 100gm was placed on upper slide. The weight was removed and extra formulation was scrapped off. The lower slides was fixed on board of apparatus and upper slide was fixed with nonflexible string on which 20g load was applied. Time taken by slide to slip off was noted down.

![Figure 3. Spreadability](image3)

E. Antimicrobial Activity – [12]

When the wound has been occurred then there may be chances of bacterial or microbial infection from environment and Cinnamon, Nutmeg, Clove and Ginger acts as antimicrobial, antiseptic and anti-inflammatory activity.

**Procedure:**

In this method the agar is melted, cooled at 45°C, Inoculate with the test microorganism and then pour in the sterile petri plate. In this method when the agar plate has been solidified then holes about 9mm in diameter in the medium with sterile cork borer, Then the antimicrobial agent are placed in the hole and in another hole placed marketed formulation acts as standard, the diameter of zone of inhibition were measured after inoculation at 30-35°C for 2-3 days. The diameter of zone of inhibition gives an indication of the relative activity of different antimicrobial substance against tested microorganism.

![Figure 4. Pseudomonas](image4)
F. Skin irritation study – [13]

In that we were take 0.5g of herbal ointment and they are applied to the area pf approximately 6cm² of skin and then the skin were covered with a gauze patch for 1hr it should be in contact with skin, the patch was removed after completed time duration and observation has been recorded, control animal were prepared in the same manner and 0.5g of ointment using all ingredient except the herbal extract was applied to the control animal and observation were made as same as that of test animal, The ointment was applied to the skin once a day for 7 days and observed for any sensitivity and reaction.

G. Stability Studies -[14]

The stability of the formulation was tested by filling the ointment in plastic container and placing it in humidity chamber at 45°C and 75% relative humidity. The stability of the formulation was inspected for 3 months at interval of One month each.

V. RESULT

□ This ointment could become a media to use these medicinal properties effectively and easily as simple dosage form.

□ Natural Remedies are more acceptable as they are safer with fewer side effects than synthetic once, so a herbal wound healing formulation is nontoxic, safe, effective and improve patient compliance as it contain herbal ingredient. From the ancient time.

<table>
<thead>
<tr>
<th>Evaluation Parameter</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Dark reddish brownish colour, Lavender odour</td>
</tr>
<tr>
<td>pH</td>
<td>3.62</td>
</tr>
<tr>
<td>Consistency</td>
<td>Smooth</td>
</tr>
<tr>
<td>Spread ability</td>
<td>Easily Spreadable</td>
</tr>
<tr>
<td>Skin irritation test</td>
<td>No irritation</td>
</tr>
</tbody>
</table>

Antimicrobial Activity

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Test Microorganism</th>
<th>Diameter of zone of inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>1</td>
<td>Bacillus</td>
<td>18mm</td>
</tr>
<tr>
<td>2</td>
<td>Streptococcus</td>
<td>16mm</td>
</tr>
<tr>
<td>3</td>
<td>Klebsiella pneumonia</td>
<td>19mm</td>
</tr>
<tr>
<td>4</td>
<td>Pseudomonas</td>
<td>18mm</td>
</tr>
<tr>
<td>5</td>
<td>Fungi</td>
<td>17mm</td>
</tr>
</tbody>
</table>

□ These prepared herbal wound healing ointment was evaluated for various parameters like appearance, determination of consistency, Spreadability, Skin irritation test and antimicrobial activity against Bacillus, Streptococcus, Klebsiella pneumoniae, pseudomonas and fungi (Asparagus niger).

VI. CONCLUSION

□ The main aim of formulated herbal antimicrobial and antibacterial wound healing ointment was to cure or treat the wound and injury.
It was concluded that the wound healing ointment which are prepared from natural sources they shows fewer side effect as compared to ointment which are prepared from synthetic compound

The prepared wound healing ointment was evaluated using various parameter and was found to be satisfied for the application to the skin where the injury has been occurs

The prepared ointment was planned to carry out with in vivo studied for its irritancy

VII. REFERENCE


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