INTRODUCTION

Herbal products are largely preferred to synthetic drugs due to their widespread availability as well as the vast empirical and accessible data regarding to their traditional use. However, modern scientific methods should be applied to validate the claims about the therapeutic effects of the plants, resulting in confirmation the traditional system of medicine. Along with other dosage forms, herbal drugs are also formulated in the form of ointment. Medicated ointments contain a medicament dissolved, suspended or emulsified in the base.

Adansonia digitata is a native deciduous tree of African savannas belongs to Bombacaceae family, the bombax or kapok family. It is used in the treatment of bronchial asthma, dermatitis, sickle cell anemia, diuretic, anti-diabetic, diarrhoea, dysentery, laxative, hiccough in children, anti-oxidant, anti-inflammatory, antidote for poison, anti-trypanosomuses.

Tulsi is an aromatic shrub in the basil family Lamiaceae (tribe ocimeae) that is thought to have originated in north central India and now grows native throughout the eastern world tropics. The medicinal properties of tulsi have been studied in hundreds of scientific studies including in vitro, animal and human experiments. These studies reveal that Tulsi has a unique combination of actions that include: Antimicrobial (including antibacterial, antiviral, antifungal, antiprotozoal, antimalarial, antimicrobial, mosquito repellent, anti-diarrheal, anti-oxidant, anti-cataract, anti-inflammatory, chemo preventive, radioprotective, hepatoprotective, neuro-protective, cardio-protective, anti-diabetic, anti-hypercholesterolemia, anti-hypertensive, anti-carcinogenic, analgesic, anti-pyretic, anti-allergic, immunomodulatory, central nervous system depressant, memory enhancement, anti-asthmatic, anti-tussive, diaphoretic, anti-thyroid, anti-fertility, anti-ulcer, anti-emetic, anti-spasmodic, anti-arthritis, adaptogenic, anti-stress, anti-cataract, anti-leukodermal and anti-coagulant activities.

MATERIALS AND METHODS

Collection and authentication of Plant material

Leaves of Adansonia digitata Linn. (Family: Malvaceae) were collected from Medicinal Garden, Pravara Rural College of Pharmacy, Pravaranagar. The plant was authenticated by Department of Botany and Research centre, PVP College Loni with reference number PVPC/Bot/2021/22-121-1.

The ethanolic extracts of Ocimum sanctum were collected from the Amsar Private Ltd., Indore, India.

Preparation of A. digitata leaves extract

The Adansonia digitata leaves were dried under shed and grind into fine powder, using pestle and mortar. Then a 100g of the ground powder was dissolved in 400 mL ethanol (70%), and incubated for 48 hours at room temperature. The extract was then filtered using maceration Method, and the supernatant was then boiled
to evaporation. Finally, ethanolic extract was collected and concentrated. The extract was stored in the airtight container at cool and dark place.

**Formulation of Ointment**

Formulation of ointment base:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Ingredient</th>
<th>Quantity to be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Wool fat</td>
<td>0.5g</td>
</tr>
<tr>
<td>2.</td>
<td>Hard paraffin</td>
<td>0.5g</td>
</tr>
<tr>
<td>3.</td>
<td>Cetostearyl alcohol</td>
<td>0.5g</td>
</tr>
<tr>
<td>4.</td>
<td>White soft paraffin</td>
<td>8.5g</td>
</tr>
</tbody>
</table>

**Formulation of Herbal ointment:**

<table>
<thead>
<tr>
<th>Formulation code</th>
<th>Prepared <em>A. digitata</em> leaves extract (g)</th>
<th><em>Ocimum sanctum</em> Leaves extracts (g)</th>
<th>Ointment base q.s. (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>1</td>
<td>0.5</td>
<td>10</td>
</tr>
<tr>
<td>F2</td>
<td>0.5</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>F3</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

**Procedure for preparation of herbal ointment**

a) Initially ointment base was prepared by weighing accurately grated hard paraffin which was placed in evaporating dish on water bath at 70°C. After melting of hard paraffin remaining ingredients were added and stirred gently to aid melting and mixing homogeneously followed by cooling of ointment base.

b) Herbal ointment was prepared by mixing *A. digitata* leaves and *Ocimum sanctum* Leaves extract to the ointment base by levigation method to prepare a smooth paste with 2 or 3 times its weight of base, gradually incorporating base until to form homogeneous ointment, finally transferred in a suitable container.

**Evaluation**

1. **Colour and Odour**

   Physical parameters like colour and odour were examined by visual examination.

2. **Consistency**

   Smooth and greediness is observed.

3. **PH**

   2 gm ointment formulations sample of each batch was taken in 100 ml dry beaker, 50 ml water was added to it. Beaker was heated on water bath maintained at about 60°C to 70°C for 10 minutes, cooled to room temperature. The pH measurements were done by using a digital type pH meter by dipping the glass electrode into the ointment formulation. PH was determined in triplicate for the solution and average value was calculated.

4. **Spreadability**

   The spreadability was determined by placing excess of sample in between two slides which was compressed to uniform thickness by placing a definite weight for definite time. The time required to separate the two slides was measured as spreadability. Lesser the time taken for separation of two slides results better spreadability.

   Spreadability was calculated by following formula

   \[ S = M \times L / T \]

   Where, 
   
   \[ S \] = Spreadability  
   \[ M \] = Weight tide to the upper slide  
   \[ L \] = Length of glass slide  
   \[ T \] = Time taken to separate the slides

5. **Extrudability**

   The formulation was filled in collapsible tube container. The extrudability was determined in terms of weight of ointment required to extrude 0.5cm of ribbon of ointment in 10 seconds.

6. **Diffusion study**

   The diffusion study was carried out by preparing agar nutrient medium. A hole board at the center of medium and ointment was by placed in it. The time taken by ointment to get diffused through was noted. (After 60 minutes)

7. **Washability**

   Ointment formulations were applied on the skin and then ease extend of washing with water was checked. Washability was checked by keeping applied skin area under the tap water for about 10 min.

8. **Non irritancy Test**

   Herbal ointment prepared was applied to the skin of human being and observed for the effect.

9. **Viscosity**

   The measurement of viscosity of prepared ointments was carried out with Brookfield Viscometer. The values of each ointment formulation were done in triplicate.
10. Antimicrobial activity

The extracts of plants were taken in different ratios were carried out for anti-microbial activity using cup plate method. Nutrient agar medium was prepared, sterilized and used as growth medium for bacterial culture. 25 ml of sterilized medium was poured into each petri plates, covered semi half and allowed it to solidify. Then the test microorganism *Staphylococcus aureus* was inoculated into the petri plates. Then different formulations were poured inside the plates were incubated at 37°C overnight for observation. The presence of zone of inhibition was noted after 24 hrs. The susceptibility of the test to the tested plant extracts was determined by observing the zone of inhibition around each well.

11. Content Uniformity

10mg of the ointment was taken and dissolved in distilled water. Then absorbance was measured at 405 nm and 410 using UV-Visible spectrophotometer.

12. Stability study

Physical stability test of the herbal ointment F3 was carried out for Two Months at various temperature conditions like 20°C, 25°C and 37°C. The herbal ointment was found to be physically stable at different temperature i.e., 20°C, 25°C, 37°C within four weeks.

**RESULTS AND DISCUSSION**

**Table 3: Evaluation Results for Colour, Odour, Consistency**

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Colour</th>
<th>Odour</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Green</td>
<td>Characteristic</td>
<td>Smooth</td>
</tr>
<tr>
<td>F2</td>
<td>Green</td>
<td>Characteristic</td>
<td>Smooth</td>
</tr>
<tr>
<td>F3</td>
<td>Green</td>
<td>Characteristic</td>
<td>Smooth</td>
</tr>
</tbody>
</table>

**Table 4: Physicochemical data of formulations**

<table>
<thead>
<tr>
<th>Formulation</th>
<th>$p^*$</th>
<th>Spreadability (gm.cm/sec)</th>
<th>Extrudability</th>
<th>Diffusion study</th>
<th>Viscosity</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>6.66</td>
<td>8.51</td>
<td>0.28gm</td>
<td>0.7 cm</td>
<td>33.32</td>
</tr>
<tr>
<td>F2</td>
<td>6.68</td>
<td>9.2</td>
<td>0.26 gm</td>
<td>0.8 cm</td>
<td>33.44</td>
</tr>
<tr>
<td>F3</td>
<td>6.68</td>
<td>8.32</td>
<td>0.28 gm</td>
<td>0.8 cm</td>
<td>33.26</td>
</tr>
</tbody>
</table>

**Table 5: Evaluation Results for Washability, non-irritancy Test**

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Washability</th>
<th>Non irritancy Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Good</td>
<td>Non irritant</td>
</tr>
<tr>
<td>F2</td>
<td>Good</td>
<td>Non irritant</td>
</tr>
<tr>
<td>F3</td>
<td>Good</td>
<td>Non irritant</td>
</tr>
</tbody>
</table>

Antimicrobial activity

**Zone of inhibition of F1, F2 and F3**

1. Formulation F1: 14.4 mm
2. Formulation F2: 16.8 mm
3. Formulation F3: 19.6 mm
4. Control (Gentamycin): 22.7 mm

**Content Uniformity**

Drug content of formulations was found to be in between 96% to 98.7%.

**Figure 2: Comparative Study of Antimicrobial activity F1, F2 and F3**

**Stability study of F3 Formulation for 8 Weeks**

**Table 6: Formulations were found to be stable at different temperature i.e., 20°C, 25°C, 37°C.**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Colour</th>
<th>Odour</th>
<th>Consistency</th>
<th>Non irritancy Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>20°C</td>
<td>Green</td>
<td>Characteristic</td>
<td>Smooth</td>
<td>Non irritant</td>
</tr>
<tr>
<td>25°C</td>
<td>Green</td>
<td>Characteristic</td>
<td>Smooth</td>
<td>Non irritant</td>
</tr>
<tr>
<td>37°C</td>
<td>Green</td>
<td>Characteristic</td>
<td>Smooth</td>
<td>Non irritant</td>
</tr>
</tbody>
</table>

**CONCLUSION**

*Ocimum sanctum* has been utilised as an antibacterial since ancient times. *Ocimum sanctum* and A. digitata leaves both have additional therapeutic effects. The current experimental work showed that herbal ointments containing A. digitata leaf extract and *Ocimum sanctum* leaf extracts may be developed and tested for anti-microbial activity. When prepared as an ointment for topical application, this could account for the reported efficacy of the plant’s traditional use in the treatment of common skin ailments. The ability of this herbal ointment to kill *Staphylococcus aureus* could be used to control the infection that is thought to be the primary cause of boils, carbuncles, infantile impetigo, and wounds. The final product readily spread on skin surface, showed no irritant effect, diffused well and stable at different temperature.
REFERENCES


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