Formulation and Evaluation of Herbal Anti-microbial Lotion Containing Cinnamon Oil

1Nikita Jadhav, 2Racheal Palmer

Department of Pharmaceutics
Dr. Rajendra Gode Institute of Pharmacy
Amravati, 444602, Maharashtra, India.

Abstract- There is no doubt that the trend of herbal products with essential oils included as antibacterial agents is increasing. According to reports, cinnamon oil exhibits antibacterial activity against Candida albicans, Escherichia coli, Propionibacterium acne, Streptococcus pyogenes, and Staphylococcus aureus. Antibacterial effectiveness against gram-positive and gram-negative bacteria that cause infectious diseases in humans is one of cinnamon's most well-known properties.

Cinnamon oil can lighten the skin, repair acne scars, remove infections, and improve blood flow to the afflicted area. It can also help fade away blemishes. They are frequently utilized in the perfume and Ayurvedic food preparation industries. Various antibacterial agents, both natural and artificial.

In the preparation of cosmetics, agents are utilized. Therefore, the goal of the current study project is to create and assess an antibacterial lotion that contains cinnamon oil. By using cinnamon to prepare the three formulations (F1, F2, and F3), the herbal lotion was optimized. Numerous characteristics, including physical appearance, pH, spreadability, viscosity, and irritancy test, were satisfactorily examined for the formulation. Batch F3 was shown to be the parameter's optimal choice out of all the formulation studies.

Keywords: Cinnamon, Antimicrobial, Bacteria, Escherichia coli, Salmonella typhi.

INTRODUCTION:
Since the beginning of time, people have utilized natural remedies to improve their health, and the success of contemporary medicine is primarily due to the usage of pharmaceuticals that were derived from natural resources. Many antibacterial substances were previously found in both natural and manmade products for the treatment of and managing infectious agents[1]. However, only a small number of them were accessible to the market of the impoverished world[2]. The advent of bacteria that are resistant to many drugs has further weakened the availability and cost of many of the antibiotics that are now prescribed globally[3-5].

Within the Lauraceae family, the genus Cinnamomum comprises around 300 aromatic evergreen trees and shrubs[6]. Due to their widespread use as common spices in cuisines throughout the world, four species are very important economically. Cinnamon loureiroi Nees (often referred to as Vietnamese cinnamon), Cinnamon zeylanicum Blume (a synonym of Cinnamon verum J. Presl, known as Sri Lanka cinnamon), and Cinnamon aromatiticum Nees (a synonym of Cinnamon cassia (L.)). J. Presl hybridized, known as Chinese cinnamon) [7]. Additionally, cinnamon has been utilized as a health-promoting substance to cure illnesses like urinary infections, gastrointestinal problems, and inflammation[8,9]. Due to its antimicrobial qualities, particularly its antibacterial activity, cinnamon may also be used medicinally. Infection is one of the main causes of sickness and mortality in the globe, as is widely known.

Several active ingredients can be found in cinnamon extract, including cinnamaldehyde, cinnamic acid, eugenol, and coumarin. Numerous pharmacological activities, such as anti-oxidant, antimicrobial, anti-inflammation, and anti-diabetic, properties have been demonstrated by these components. Research has shown that flavonoids, polyphenolic, and phenolic compounds of cinnamon are in charge of the free radical scavenging reaction or antioxidant activity of cinnamon extract and its oil [10-14].

A persistent inflammatory condition affecting the pilosebaceous unit is acne. Comedones, papules, pustules, inflammatory nodules, superficial pus, filed cysts, and, in severe cases, canalizing and deep scarring are the characteristics that define it. The areas having the greatest concentration of sebaceous glands are where acne appears. The scalp, face, and the pustular contents of acne are typically home to the bacteria Propionibacterium acneus, Staphylococcus epidermis, S. aureus, and the fungus Candida albicans, which are found in the neck, chest, back, upper arms, and shoulders. A frequent skin condition linked to microbial infections is acne. Antimicrobial drugs are needed for its therapy. Acne vulgaris, also referred to as acne, is a skin disorder that affects people and is characterized by scaly red skin (seborrhea), comedones (black and white pimples), papules (pinheads), big papules (nodules), pimples, and scars[15].
MATERIALS AND METHODS :
A. MATERIALS:
Cinnamon

Synonym - Cinnamomum verum

Biological sources - The biological source of cinnamon is the dried inner bark of the shoots of collected trees of Cinnamomum zeylanicum Nees (Cinnamomum verum J.S. Presl) belonging to family lauracea Species: Cinnamomum.

![Figure 1: Cinnamomum zeylanicum](image)

Chemical Constituents – Cinnamon is made up of several resinous substances, like several essential oils, cinnamaldehyde, cinnamate, and cinnamic acid. Owning to the existence of cinnamaldehyde, which results from oxygen absorption, there is a spicy flavor and scent. The color of cinnamon darkens with age. Enhancing the resinous flavor.

Uses:
1. Cinnamon has antibacterial qualities and is effective in curing acne.
2. It has potent antioxidant properties as well as anti-aging properties.
3. It can give skin a plumper, more even tone.

B. METHODS:
Formulation of lotion

Phase A (Water phase)
1. Measure the carbapole 934 precisely and dissolve it in half amount of hours.
2. Take another 50% of deionized water and add propylparaben, methylparaben, citric acid, cinnamon oil, organic glycerin, hydrogenated. Clove oil under constant stirring at 250-300 RPM followed by the addition of carbopol 934 water solution under continuous stirring.

Phase B (oil phase)
1. Take accurately weighted cetostearyl alcohol and melt it at 70°C followed by the addition of stearic acid and continue melting at 70°C add coconut oil and liquid paraffin oil to the above melted mixture.
2. Heat phase A at 60°C and, slowly start the addition of phase A into phase B under continuous homogenization, followed by homogenizing the entire content for the next 15 mins.
3. Let everything cool to room temperature before adding the peppermint essential oil and stir continuously.
4. The formulation is evaluated for color, odour, pH, density, physical appearance, viscosity, and spreadability.

<table>
<thead>
<tr>
<th>Sr.no</th>
<th>Ingredients</th>
<th>Formulation code</th>
<th>Role of ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cinnamon oil</td>
<td>F1</td>
<td>F2</td>
</tr>
<tr>
<td>2</td>
<td>Glycerine</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>3</td>
<td>Carabapol 934</td>
<td>1%</td>
<td>1.5%</td>
</tr>
<tr>
<td>4</td>
<td>Methylparaben</td>
<td>0.05%</td>
<td>0.05%</td>
</tr>
<tr>
<td>5</td>
<td>Clove oil</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>6</td>
<td>Peppermint oil</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>7</td>
<td>Citric acid</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>8</td>
<td>Distilled water</td>
<td>Q.S.</td>
<td>Q.S.</td>
</tr>
</tbody>
</table>

Table No. 1: Formulation of Lotion
9. Coconut oil 3% 3% 3% Skin nutrients promoter
10. Liquid paraffin 5% 5% 5 Base oil
11. Cetostearyl alcohol 3% 3% 3% Emollient
12. Stearic acid 2% 2% 2% Co-emulsifier

Figure 2: Formulation F1, F2 & F3

BACTERIAL CULTURES:
Escherichia coli and Salmonella typhi were collected from the Department of Microbiology, Dr Rajendra Gode Institute of Pharmacy, Amravati, and Maharashtra. All microbes are sub-cultured on nutrient agar.

ANTIMICROBIAL ACTIVITY:
The agar well diffusion method was used to test Cinnamomum zeylanicum's antibacterial activity (Aneja et al., 2009). Using this technique, a pure isolate of every microbe was grown for 24 hours at 37 °C on nutrient agar. Every microbial suspension's density was changed to match that standardized using the 0.5 McFarland standard to 10^6 cfu/ml and utilized as the inoculum for the agar well diffusion assay. To attain a confluent growth, 100 µl of the inoculum of every test organism was applied to the nutrient agar plates. After letting the agar plates dry, sterile borer wells measuring 8 mm were created. Three different concentrations of the test extract (100 µl) were injected straight into the wells. The plates were incubated at 37 °C for 24 hours after being left to stand for 10 minutes to allow the extract to diffuse (Aneja et al., 2009).

EVALUATION OF LOTION:
1. Appearance:
The lotion’s uniformity, color, and smell were all visually appealing.
2. Consistency and Grassiness:
Both this parameter was performed on the skin. They both were checked by applying on the skin.
3. Spreadability test:
A 0.1g Sample was applied between two glass slides and was compressed to uniform thickness by placing 100gm weight for 5 minutes. Weight was introduced in the pan. The spreadability was calculated by using the radius of the circle formed by the compressed slide.
Spreadability =m*l/t m = Weight tide to upper slide.
1 = length shifted on the sliding glass surface.
t = time taken.
4. Washability:
For ten minutes, a small amount of lotion was applied to the hand’s skin and left to run under the force of tap water. A manual time check was performed to determine when the lotion was fully gone.
5. pH:
Lotion pH was measured with a digital pH meter. The pH meter was calibrated using a standard buffer solution. About 1% of the lotion was weighed in a 100 ml beaker combined with 45.0 ml of distilled water and diffused the lotion in it. The pH of the lotion was measured at 27 using the pH meter.
6. Stability Test:
The formulation was put in the middle of the petri dish, and the plates were then incubated at 37°C for 72 hours to monitor the microbial growth.
RESULTS AND DISCUSSION:
After being made, the herbal lotion was assessed based on several factors. The color of the herbal composition was somewhat off-white. Throughout the trial, the pH was between 5 and 6, which is within the typical pH range of the skin, and the lotion did not cause any skin irritation when applied. Three herbal lotion formulations (F1, F2, and F3) were created for me. After the assessment test observation, the F3 formulation is the best one.
Table No. 3 shows the result of an experiment testing the effectiveness of the extract at different concentrations against two bacteria- Escherichia coli and Salmonella typhi. At concentrations of (0, 20, 40, 60, 80, and 100mg/ml) the inhibition of bacterial growth was measured. As the concentration of the extract increased there was a corresponding increase in the inhibition of both bacteria. However, when comparing the effectiveness of the extract with amoxicillin a common antibiotic, it is clear that amoxicillin is more potent at inhibiting the growth of both bacteria, even at a low concentration of 5mg/ml.
After the stability test was completed, the results showed that all of the lotions had improved stability. These findings showed that the herbal lotion had no negative effects on the topical region and that the formulation was stable under standard storage settings. Research has demonstrated the benefits of this herbal remedy for inflammation, and anti-aging. Compared to F1&F2, F3 showed a bigger zone of inhibition.

Table No. 2: Evaluation of Lotion

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formulation F1</td>
<td>Formulation F2</td>
</tr>
<tr>
<td>1.</td>
<td>Absorbance</td>
<td>Lotion type</td>
</tr>
<tr>
<td>2.</td>
<td>Color</td>
<td>Off-white</td>
</tr>
<tr>
<td>3.</td>
<td>Odur</td>
<td>Cinnamon like</td>
</tr>
<tr>
<td>4.</td>
<td>Spreadability</td>
<td>Easily spreadable</td>
</tr>
<tr>
<td>5.</td>
<td>Washability</td>
<td>Easily washable</td>
</tr>
<tr>
<td>7.</td>
<td>pH</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td>Stability test</td>
<td>No microbial growth is observed</td>
</tr>
</tbody>
</table>

Table No. 3: The Zone of Inhibition in mm (± sd) of Methanolic Extract of Cinnamomum zeylanicum.

<table>
<thead>
<tr>
<th>Concentration of plant extract (mg/ml)</th>
<th>Escherichia coli</th>
<th>Salmonella typhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Methanol)</td>
<td>8.67±0.58</td>
<td>8.67±0.58</td>
</tr>
<tr>
<td>20</td>
<td>9.67±0.58</td>
<td>8.67±0.58</td>
</tr>
<tr>
<td>40</td>
<td>9.67±0.58</td>
<td>9.67±0.58</td>
</tr>
<tr>
<td>60</td>
<td>11.67±0.58</td>
<td>12.67±0.58</td>
</tr>
<tr>
<td>80</td>
<td>13.67±0.58</td>
<td>16.67±0.58</td>
</tr>
<tr>
<td>100</td>
<td>16.67±0.58</td>
<td>20.67±0.58</td>
</tr>
<tr>
<td>Amoxicillin (5mg/ml)</td>
<td>24.67±0.58</td>
<td>32.33±0.58</td>
</tr>
</tbody>
</table>

CONCLUSION:
Natural cures are beneficial for all illnesses. Herbal formulations are required in the global market to satisfy consumer demand. It is thought that herbal remedies are safer than allopathic ones. Every formulation was refined according to assessment criteria like pH, washability, physical appearance, and antimicrobial activity, drug content, and spreadability. After examination, the study concludes that formulation batch F3, or the lotion that combines the two, is superior to formulations F1 and F2. The main goal of this study is to produce an herbal lotion. Give skin health-promoting nutrients. There are many different types of natural herbs that can be used in skincare solutions. Their specific features allow them to be especially helpful as antioxidants.

REFERENCES:


