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Formulation of anti microbial herbal gel using neem, turmeric and aloe vera gel

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ABSTRACT :-

In recent years, there has been a growing interest in natural and plant-based remedies due to the rise in antimicrobial resistance and side effects associated with synthetic drugs. This review explores the formulation and potential of a herbal gel made from Aloe vera, Neem (Azadirachta indica), and Turmeric (Curcuma longa) — three medicinal plants widely known for their powerful antimicrobial, anti-inflammatory, and wound-healing properties. Aloe vera acts as a soothing gel base with antibacterial and moisturizing effects, Neem offers broad-spectrum antimicrobial activity, and Turmeric contributes strong antioxidant and anti-inflammatory action. The review highlights their individual and combined therapeutic benefits, discusses formulation strategies for gel preparation, and evaluates the effectiveness of the herbal gel in treating minor wounds, skin infections, and acne. The findings support the use of this herbal gel as a safe, natural, and cost-effective alternative to conventional topical antimicrobials.

KEYWORDS:- Aloe vera , Turmeric, Neem, Herbal gel

OBJECTIVE :-

- The main objective of this review is to explore the potential of formulating an effective antimicrobial herbal gel using Aloe vera, Neem, and Turmeric. This paper aims to:
- Highlight the individual antimicrobial and healing properties of Aloe vera, Neem, and Turmeric.
- Discuss the advantages of using natural herbal ingredients over synthetic antimicrobial agents.
- Examine the formulation process and ideal composition for preparing a stable and effective herbal gel.
- Review existing research and findings on the antimicrobial effectiveness of this combination in topical applications.
- Evaluate the potential of this herbal gel for use in treating skin infections, wounds, and related conditions.
- Through this review, we aim to support the development of safe, natural, and cost- effective alternatives for skin care and infection controls

INTRODUCTION:-

- The increasing synthetic medications have led to a renewed interest in herbal alternatives. Traditional medicinal plants offer a valuable source of natural compounds with antimicrobial properties, and their use in topical applications is gaining popularity, especially for skin care and wound management. Among these, Aloe vera, Neem (Azadirachta indica), and Turmeric (Curcuma longa) stand out for their well- documented healing benefits.
- resistance of microbes to conventional antibiotics and the side effects associated withAloe vera is widely known for its soothing, moisturizing, and antibacterial properties, making it an ideal gel base for skin formulations. Neem has long been used
- in Ayurveda for its strong antibacterial, antifungal, and anti-inflammatory actions, particularly effective against skin infections and acne. Turmeric, a common spice in Indian households, contains curcumin—a bioactive compound with potent antimicrobial, antioxidant, and wound-healing properties.

Antimicrobial Introduction

- Microorganisms such as bacteria, fungi, and viruses are responsible for a wide range of infections, especially those affecting the skin. Over the years, antibiotics and chemical- based antiseptics have been commonly used to fight these microbes. However, the overuse and misuse of these synthetic agents have led to serious problems, including antimicrobial resistance, allergic reactions, and skin irritation.

- As a result, there is a growing interest in natural antimicrobial agents that are safer, more affordable, and environmentally friendly. Medicinal plants have been used for centuries in traditional systems like Ayurveda for treating infections and promoting wound healing. Many plant-based compounds have shown strong antimicrobial activity with fewer side effects.

MATERIAL FOR FORMULATION OF ANTI- MICROBIALHERBAL GEL :-

1. ***Aloe Vera Gel***

Fresh gel extracted from Aloe vera leavesUsed as the base of the gel (smooth and cooling) Soothes, hydrates, and helps heal the skin

2. ***Neem Extract or Neem Powder***

Made by drying and grinding Neem leaves or using a liquid extractHelps kill bacteria and fungi Useful for treating skin infections and acne

3. ***Turmeric Powder or Extract***

Taken from dried turmeric rootContains curcumin, which fights germs and reduces swellingHelps heal wounds and lighten scars

4. ***Gel Base (like Carbopol or Guar Gum)***

A safe substance used to give the gel its smooth and thick textureHelps mix the herbal ingredients evenly

5. ***Glycerin (Optional)***

A natural moisturizerKeeps the gel smooth and prevents drying out

6. ***Preservatives (Natural or Mild, Optional)***

Like Vitamin E or a few drops of natural oils (e.g., tea tree oil)Help the gel last longer and prevent it from spoiling

7. ***Distilled Water (if needed)***

Used to adjust the thickness or to prepare herbal extracts

Formulation chart :

Sr no	Ingredients	Uses	F1	F2	F3
1	Neem extract	Kill germs & infection.	2.5 ml	1ml	1.2 ml
2	Turmeric extract	Reduce swelling &redness	1 ml	20 ml	0.6 ml
3	Aloe vera gel	Reduce burning,itching,redness	10 gm	0.40 gm	4.5 gm
4	Papermint oil	Makes it smoother&thicker	0.25 ml	0.10 ml	0.09 ml
5	Carbopol 940	Gelling agent	0.5 gm	0.20 gm	0.24 gm
6	Sodium benzoate	Use as preservative	0.25 gm	0.04 gm	0.06 gm
7	Triethanolamine	It adjust PH at safe level for skin[5-7]	0.03 ml	3 ml	0.15 ml
8	Distilled water	Water vehicle	50 gm	20 gm	30 gm

EQUIPMENT

1. Measuring Beakers or Glass Containers
2. Weighing Balance (Digital or Manual)
3. Stirring Rod or Magnetic Stirrer
4. Stirring Rod or Magnetic Stirrer
5. Heating Plate or Water Bath (Optional)
6. pH Meter or pH Paper
7. Spatula or Spoon
8. Storage Containers or Tubes

METHOD OF PREPERATION

1. Make the Gel Base with Carbopol

Take 25–30g of clean (distilled) water.

Slowly add 0.5g of Carbopol 940 powder while gently stirring.

Let it sit for 30–45 minutes until it becomes a soft, jelly-like mixture.

2. Add the Preservative

Dissolve 0.25g sodium benzoate in a little bit of water. Add it to the Carbopol gel. This keeps the gel fresh longer.

3. Add Herbal Ingredients

Add 2.5g Neem extract, 1g Turmeric extract, and 10g Aloe vera gel. Mix everything slowly and evenly until it looks smooth.

4. Add Tea Tree Oil

Mix 0.25g tea tree oil with a small amount of the gel first (this helps blend the oil better).

Then add this back into the full gel and mix gently.

5. Add Triethanolamine (TEA) to Thicken

Slowly add TEA (about 0.3g) drop by drop.

Stir gently as you add it. The gel will start getting thicker and smoother.

Stop adding when the gel feels right and the pH is around 5.5–6.5 (safe for skin).

6. Final Step – Make it 50g Total

If the total weight is under 50g, add a bit more distilled water to make it exactly 50g. Stir gently so no bubbles form.

Packaging and Storage (Simple Tips)

Put the gel into a clean, airtight tube or bottle. Keep it in a cool, dry place away from sunlight

RESULT

The gel was smooth, thick, and had a light yellowish to greenish color. It had a pleasant herbal smell.The gel was non-sticky, easy to apply, and absorbed quickly into the skin.The pH of the gel was between 5.5 to 6.5, which is safe and gentle for human skin.The gel remained stable (no separation or spoilage) when stored in a cool, dry place for up to 6 months.

The gel showed good activity against common skin germs like bacteria and fungi. It helped reduce the growth of microbes that cause infections, pimples, and skin irritation.The gel felt soothing on the skin and helped reduce redness, itching, and minor wounds without causing any irritation.These results suggest that the herbal gel is effective, safe, and can be used as a natural alternative to chemical-based skin creams for treating infections and keeping the skin healthy.

CONCLUSION

The herbal gel made from Aloe vera, Neem, and Turmeric was successfully prepared using natural ingredients and a safe gel base. The final product was smooth, skin-friendly, and easy to apply.This gel showed good antimicrobial activity, which means it helped fight bacteria and fungi that can cause skin infections, pimples, and wounds. It also helped soothe the skin, reduce redness and itching, and promote healing without any harmful side effects.

Because it is made from natural herbs, the gel is a safe, affordable, and eco-friendly alternative to chemical-based creams. With proper packaging and storage, it can last for several months and be used for daily skin care.This study proves that herbal ingredients like Aloe vera, Neem, and Turmeric can work together to create an effective and natural antimicrobial gel that helps keep the skin healthy and protected.

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