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Skincare Cream

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ABSTRACT:

Neomycin sulphate is a broad-spectrum aminoglycoside antibiotic derived from Streptomyces fradiae. It is widely used for its bactericidal activity against Gram-negative and some Gram-positive bacteria by inhibiting protein synthesis via binding to the 30S ribosomal subunit. Due to its poor absorption in the gastrointestinal tract, it is primarily administered .Despite its effectiveness, prolonged or high-dose use can lead to nephrotoxicity and ototoxicity. Resistance mechanisms, including enzymatic modification and efflux pumps, have emerged, limiting its clinical applications. Current research explores novel formulations and combination therapies to enhance efficacy and minimize toxicity.Miconazole nitrate is a broad-spectrum antifungal agent belonging to the imidazole class. It is widely used for the treatment of superficial and systemic fungal infections, particularly those caused by Candida species and Dermatophytes. Its mechanism of action involves inhibiting ergosterol synthesis, disrupting fungal cell membrane integrity, and leading to cell death. Miconazole nitrate is commonly formulated in topical creams, powders, and oral gels for treating skin infections.

KEYWORDS:

1. Neomycin Sulphate .
2. Miconazole Nitratre.
3. Generic Medicine.
4. Skin Cure.

INTRODUCTION :

Miconazole nitrate and neomycin sulphate are two widely used pharmaceutical agents, each with distinct antimicrobial properties. Miconazole nitrate is an imidazole antifungal that targets fungal infections by disrupting ergosterol synthesis, a crucial component of fungal cell membranes. It is commonly used in the treatment of dermatophytosis, candidiasis, and other superficial mycoses, available in topical, oral, and vaginal formulations.

Neomycin sulphate, on the other hand, is an aminoglycoside antibiotic with broad- spectrum antibacterial activity against Gram-negative and some Gram-positive bacteria. It inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit. Due to its poor gastrointestinal absorption, neomycin sulphate is primarily used topically for skin infections, in ophthalmic preparations, and orally for bowel sterilization before surgery and hepatic encephalopathy management. However, its use is limited by potential nephrotoxicity and ototoxicity, particularly with prolonged or high-dose exposure.

The combination of miconazole nitrate and neomycin sulphate is often employed in dermatological preparations to treat mixed fungal and bacterial infections, providing broad-spectrum coverage. Research continues to explore improved formulations and delivery systems to enhance their efficacy and minimize adverse effects.

Aim and Objective:

Aim :-

The research's objective was to create and assay miconazole nitrate and neomycin sulphate with uses of skin care

Objectives :-

Miconazole Nitrate :

- Antifungal Treatment
- Inhibition of Fungal Growth
- Topical and Systemic Use
- Anti-Inflammatory Properties

- Broad-Spectrum Antifungal Activity
- Improved Drug Delivery Research Neomycin Sulphate
- Broad-Spectrum Antibacterial Activity
- Treatment of Skin Infections
- Management of Hepatic Encephalopathy
- Combination Therapy

Drug Profile :

Miconazole nitrate :- Synonyms: Monistat. Common Name: Miconazole.
Biological Source: Synthetic; chemically synthesized in laboratories.
Geographical Source: Manufactured globally by pharmaceutical companies in regions such as the United States, India, and China.
Neomycin Sulphate :-
Botanical Name: Streptomyces fradie. Synonyms: Framycetin sulfate.
Common Name: Neomycin.
Biological Source: Obtained from the bacterium Streptomyces fradiae, a species of actinomycetes.
Geographical Source: Found in soil samples worldwide; industrial production occurs in countries with advanced pharmaceutical fermentation industries, such as the USA, China, India, Japan, and European nations.

Properties:

Pharmacological Properties in Skin Care**:-**
Antifungal
Anti-inflammatory Properties Mild Antibacterial Antibacterial
Prevention of Secondary Infections Synergistic Effect in Combination Therapy Effective for Mixed Infections

Side Effects:

- Skin irritation (redness, itching, burning)
- Contact dermatitis
- Rare allergic reactions
- Allergic reactions (rash, contact dermatitis)
- Ototoxicity (hearing loss) and nephrotoxicity with prolonged use

Applications & Uses:

- Fungal skin infections: Athlete's foot, ringworm, candidiasis.
- Bacterial skin infections: Secondary bacterial infections caused by
- *Staphylococcus aureus*.
- Mixed infections: Treats dermatophyte infections complicated by bacterial superinfection.

Combination Use in Skin Care:-

Many antifungal-antibiotic combination creams include miconazole nitrate + neomycin sulfate to treat mixed fungal and bacterial infections. This combination is useful for conditions like:

- Fungal infections with secondary bacterial infection
- Inflamed or infected eczema
- Diaper rash with yeast and bacterial involvement

Experimental Studies:

A. Materia Used:-

i. Base Components:
   - Petroleum Jelly (Petrolatum)
   - Mineral Oil
   - Lanolin

ii. Emulsifiers & Surfactants:

- Polysorbate 60 or 80
- Cetyl Alcohol & Stearyl Alcohol
- Glyceryl Monostearate

iii. Humectants & Moisturizers:

- Propylene Glycol
- Glycerin

iv. pH Adjusters & Preservatives:

- Benzyl Alcohol
- Methylparaben & Propylparaben
- Citric Acid or Sodium Hydroxide

B .Methodology:-

A topical cream is the most common formulation for these compounds. The formulation process involves:

1. Selection of Ingredients:

- Active Ingredients**:**
  - Miconazole Nitrate (Antifungal)
  - Neomycin Sulphate (Antibacterial)
- Base Ingredients**:**
  - Emulsifying agents (e.g., polysorbates, cetyl alcohol)
  - Humectants (e.g., glycerin, propylene glycol)
  - Preservatives (e.g., parabens, benzyl alcohol)
  - pH adjusters (e.g., citric acid, sodium hydroxide)

2. Manufacturing Steps:

i. Phase Preparation**:**
   - Aqueous phase**:** Dissolve water-soluble components, including Neomycin Sulphate, in deionized water.
   - Oil phase**:** Melt oil-soluble components, including Miconazole Nitrate, in an appropriate solvent.

ii. Emulsification**:**
   - The aqueous phase is slowly added to the oil phase under continuous stirring.
   - Homogenization is performed to achieve a uniform texture.

iii. Cooling and pH Adjustment**:**
   - The mixture is cooled to room temperature.
   - pH is adjusted to match skin compatibility (around pH 5.5-6.5).

iv. Packaging and Storage**:**
   - The final product is filled into tubes/jars.
   - Stability studies are to be conducted to ensure shelf-life. Evaluates physical, chemical, and microbiological stability over time.

Formulation Table:

Creation of cream composition:-

Ingredient	**Function**	**Concentration (%)**
Miconazole Nitrate	**Antifungal**	**2%**
Neomycin Sulphate	**Antibiotic**	**0.5%**
Stearic Acid	**Emulsifier**	**3-5%**
Cetyl Alchol	**Thickening Agent**	**2-4%**
Propylene Glycol	**Humectant**	**5-10%**

Liquid Paraffin	**Moisturizer**	**2-5%**
Polysorbate 80	**Surfactant (Helps API Mixing)**	**1-2%**
Methylparaben	**Preservative**	**0.2%**
Propylparaben	**Preservative**	**0.1%**
Purified Water	**Base Solvent**	**q.s.to100%**

Table No. 1

Evaluation:

A number of quality control tests, such as visual evaluation and physiochemical and conditioning performance tests, were carried out to assess the prepared formulations quality. Their usage must be carefully evaluated due to potential side effects such as allergic reactions, resistance concerns, and irritant dermatitis.

Organoleptic properties:

Parameters	**Reading 1**	**Reading 2**	**Reading 3**
Texture	**Creamy**	**Creamy**	**Creamy**
Smell	**Mild Medicinal**	**Mild Medicinal**	**Mild Medicinal**
Skin Sensation	**Cooling**	**Cooling**	**Cooling**
Appearance	**White**	**White**	**White**
Moisture Retention	**Moderate**	**Moderate**	**Moderate**

Table No.2

Evolution Tests:

- **Consistency Test:-**
  The consistency test for a cream formulation containing Miconazole Nitrate and Neomycin Sulfate is crucial to ensure spreadability, viscosity:

  To check how easily the cream spreads on the skin(Spreadibility)
  - Place 0.5g of cream between two glass plates.
  - Apply a weight (100g–500g) for 1 minute.
  - Measure the diameter of the spread area in cm.
  - Higher spreadability = better ease of application. To determine the thickness of the cream(Viscosity)
  - Use a Brookfield Viscometer .
  - Take a 5g sample, measure viscosity at 25°C using different RPM settings.
  - Compare the results to standard values for pharmaceutical creams

- **Solubility Test:-**

A) Water Solubility Test Procedure

1. Prepare a 1:1 mixture of Miconazole Nitrate and Neomycin Sulfate (by weight).
2. Add to distilled water at room temperature**.**
3. Stir continuously for 5–10 minutes.

Result: Neomycin sulfate will dissolve, but miconazole nitrate will remain largely undissolved, forming a turbid suspension.

B) Alcohol Solubility Test Procedure

1. Prepare a 1:1 mixture of Miconazole Nitrate and Neomycin Sulfate.
2. Add to ethanol or methanol.
3. Stir continuously for 5–10 minutes.

Result: Miconazole nitrate will dissolve, but neomycin sulfate may partially dissolve or precipitate, especially in ethanol.

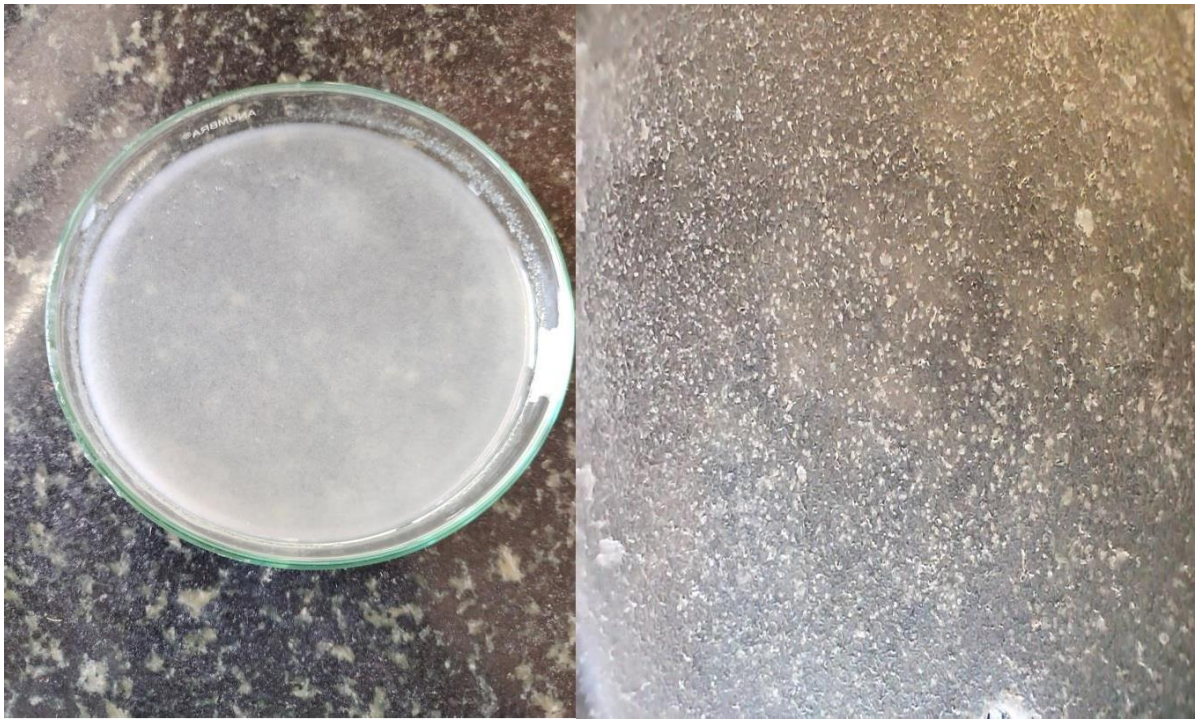
- **PH Test** :- 4.0 – 6.5 Optimal range for skin compatibility.

Formulation Code	**F1**	**F2**	**F3**
pH	**5.5**	**5.8**	**5.9**

Table No. 3

- ***Anti – Microbial Test:-***

Take agar-agar powder and mix it well with distil water. Until the mixture is been formed as the liquid solution. Then put the solution in the petri dish and keep it for 24 hours.



(A) (B)

Fig.No.1:-Image of Agar and Water .Before(A) and After(B) 24 hours Now ,after that make three spaces in the agar and water solution as below:

1. First for test cream .
2. Second for standard cream.
3. Blank .

Furtherly add the test and Standard cream for test of microbial growth in petri dish. An leave it for 24 hours

Fig.No.2:-After putting Test Cream & Standard Cream

Result:

The Microbial growth is not happening

Fig.No.3:-After 24hours there is no microbial growth seen

Medicinal Uses:-

I. Antibacterial Activity of Miconazole Nitrate & Neomycin Sulphate Mixture for Skin Care:

- A clinical dermatological study evaluated how miconazole and neomycin interact against bacterial skin infections.
- The combination was found effective against Staphylococcus aureus and Streptococcus species.
- It also showed anti-inflammatory benefits in eczema and dermatitis patients.
- The combination was effective in preventing secondary infections in burn wounds and diabetic ulcers.

- The study found that miconazole-neomycin combinations are highly effective for both human and veterinary dermatological infections.

II. Antifungal Activity of Miconazole Nitrate & Neomycin Sulfate Mixture for Skin Care:

- Neomycin, combined with antifungals like miconazole, has been found highly effective for bacterial skin infections that occur alongside fungal infections.
- Found that combining an antifungal with an antibacterial agent improved treatment success in chronic skin infections.
- Studied long-term effects of neomycin and miconazole formulations.
- The combination provided sustained protection against fungal and bacterial pathogens on the skin.
- Miconazole and neomycin mixtures have broad-spectrum effects, used in both human and animal skin treatments.

III. Healing Properties of Miconazole Nitrate and Neomycin Sulfate for Skin Care:

The combination of miconazole nitrate (an antifungal agent) and neomycin sulfate (an antibiotic) is widely used in dermatology due to its antimicrobial properties. Miconazole nitrate is effective against fungal infections such as athlete's foot, ringworm, and yeast infections, while neomycin sulfate combats bacterial infections, preventing secondary infections in damaged skin. Their combination is especially beneficial for treating mixed infections involving fungi and bacteria, often seen in eczema, burns, wounds, and dermatitis.

IV. Toxicity of Miconazole Nitrate & Neomycin Sulphate Mixture in Skin Care:

When miconazole nitrate and neomycin sulphate are used together, the risk of hypersensitivity reactions, skin irritation, and systemic toxicity increases, especially in the following cases:

- Prolonged Use
- Open Wounds/Damaged Skin
- Elderly or Infants
- Pre-existing Conditions.

Safety Recommendations:

Use for Short Durations

Avoid Open Wounds Patch Test Before Use Monitor for Side Effects

Consult a Doctor for Long-Term Use

Result & Conclusion:

Result :-

The skin care cream of miconazole nitrate and neomycin sulphate was prepared and evolved .

Conclusion :-

The combination of miconazole nitrate and neomycin sulfate is highly effective in treating mixed fungal and bacterial infections of the skin. Studies support its efficacy in treating conditions like paronychia, dermatophytosis, and secondary infections.

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