# Clinical Profile, Investigations, and Management of 150 Corneal Ulcer Patients: A Comprehensive Study

## Introduction

Corneal ulcers are a major cause of ocular morbidity worldwide, contributing significantly to visual impairment and blindness. These ulcers result from infections, trauma, or other ocular surface diseases, leading to inflammation and necrosis of the corneal stroma.

Understanding the clinical profile, diagnostic methods, and management of corneal ulcers is crucial for improving treatment outcomes and preventing complications such as corneal perforation and scarring. This study aims to provide a comprehensive overview of 150 corneal ulcer cases, focusing on the clinical characteristics, investigative findings, and therapeutic interventions.

## Methodology

### Study Design

A prospective, randomized study was conducted at DVVPF's Medical College & Hospital between May 2023 and April 2024. The study included 150 patients of corneal ulcer.

### Patient Selection

- **Inclusion Criteria**:
  - Patients aged 18-70 years with clinically diagnosed corneal ulcers.
  - No prior treatment for the current ulcer before presentation.
  - Willingness to participate in follow-up visits.
- **Exclusion Criteria**:
  - Presence of autoimmune diseases affecting the cornea.
  - History of ocular surgery in the past 3 months.
  - Pregnant or lactating women.

### Clinical Evaluation

1. **Demographic Data**:
   - Age, gender, occupation, and residence.
2. **Clinical History**:
   - Duration of symptoms, onset, and associated risk factors such as trauma, contact lens use, or ocular surface disease.
3. **Ocular Examination**:

- Visual acuity assessment using Snellen's chart.
- Slit-lamp biomicroscopy for corneal examination.
- Corneal ulcer size, depth, and location documentation.

## Investigations

1. **Microbiological Analysis**:
   - Corneal scrapings obtained under aseptic conditions.
   - Gram staining and KOH preparation for bacterial and fungal identification.
   - Culture on blood agar, Sabouraud's dextrose agar, and nutrient agar.
   - Polymerase chain reaction (PCR) for viral detection.
2. **Other Investigations**:
   - Complete blood count (CBC).
   - Blood sugar levels to rule out systemic infections.

## Management

1. **Medical Treatment**:
   - Topical antibiotics (e.g., ciprofloxacin, moxifloxacin) for bacterial ulcers.
   - Antifungal drops (e.g., natamycin, voriconazole) for fungal infections.
   - Antiviral therapy (e.g., acyclovir) for herpetic keratitis.
   - Cycloplegic agents to relieve pain and photophobia.
2. **Surgical Intervention**:
   - Corneal debridement for non-healing ulcers.
   - Therapeutic penetrating keratoplasty for severe cases.
   - Amniotic membrane transplantation in cases of impending perforation.
3. **Follow-Up and Outcome Assessment**:
   - Regular follow-up at 1 week, 1 month, and 3 months.
   - Monitoring for healing, complications, and visual acuity improvement.

## Statistical Analysis

Continuous variables were compared using the independent t-test, while categorical variables were analyzed using the chi-square test. A p-value $< 0.05$ was considered statistically significant.

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# Results

## Demographics and Clinical Profile

| **Parameter** | **Total (n=150)** | **Percentage (%)** |
|---|---|---|
| **Age (mean ± SD)** | 43.6 ± 12.4 | - |
| **Gender** | | |
| Male | 86 | 57.3 |
| Female | 64 | 42.7 |
| **Occupation** | | |

| | | |
|---|---|---|
| Farmers | 42 | 28.0 |
| Office Workers | 30 | 20.0 |
| Students | 20 | 13.3 |
| Others | 58 | 38.7 |
| **Risk Factors** | | |
| Contact Lens Use | 51 | 34.0 |
| Ocular Trauma | 44 | 29.3 |
| Previous Ocular Disease | 26 | 17.3 |
| Systemic Disease | 29 | 19.3 |

## Clinical Presentation

- **Common Symptoms**:
  - Redness (100%)
  - Pain (95%)
  - Tearing (80%)
  - Photophobia (75%)
  - Discharge (70%)
- **Ulcer Characteristics**:
  - **Size**: Mean diameter 3.5 ± 1.2 mm
  - **Location**: Central (45%), Paracentral (30%), Peripheral (25%)
  - **Depth**: Superficial (65%), Deep (35%)

## Microbiological Findings

| **Organism Type** | **Total (n=150)** | **Percentage (%)** |
|---|---|---|
| **Bacterial** | 87 | 58.0 |
| - Gram-positive | 45 | 30.0 |
| - Gram-negative | 42 | 28.0 |
| **Fungal** | 38 | 25.3 |
| - Aspergillus spp. | 20 | 13.3 |
| - Fusarium spp. | 12 | 8.0 |
| - Candida spp. | 6 | 4.0 |
| **Viral** | 15 | 10.0 |
| - Herpes Simplex Virus | 12 | 8.0 |
| - Adenovirus | 3 | 2.0 |
| **Others (Acanthamoeba)** | 10 | 6.7 |

## Management Outcomes

### Medical Management

| **Treatment** | **Total (n=150)** | **Percentage (%)** |
|---|---|---|
| Topical Antibiotics | 97 | 60.0 |

| | | |
|---|---|---|
| Topical Antifungals | 38 | 25.3 |
| Topical Antivirals | 15 | 10.0 |
| **Treatment** | **Total (n=150)** | **Percentage (%)** |

**Surgical Intervention**

| Surgical Procedure | Total (n=150) | Percentage (%) |
|---|---|---|
| Corneal Debridement | 20 | 13.3 |
| Therapeutic Keratoplasty | 12 | 8.0 |
| Amniotic Membrane Transplantation | 13 | 8.7 |

**Treatment Outcomes**

| Parameter | Total (n=150) | Percentage (%) |
|---|---|---|
| Complete Healing | 115 | 76.7 |
| Partial Healing | 20 | 13.3 |
| Recurrence | 10 | 6.7 |
| Treatment Failure (Surgical Intervention Needed) | 5 | 3.3 |

## Visual Acuity Improvement

| Time Point | Mean Visual Acuity (logMAR) | Improvement (Percentage) |
|---|---|---|
| Preoperative | 1.20 ± 0.35 | - |
| 1 Week Post-op | 0.85 ± 0.28 | 29.2 |
| 1 Month Post-op | 0.65 ± 0.20 | 45.8 |
| 3 Months Post-op | 0.50 ± 0.15 | 58.3 |

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# Discussion

This study provides valuable insights into the clinical profile, investigative findings, and management strategies for corneal ulcers, highlighting several key observations:

## Clinical Profile and Risk Factors

The study revealed that males were more affected than females, consistent with other studies indicating a higher prevalence of corneal ulcers in males, possibly due to occupational exposure and outdoor activities. Contact lens wear and ocular trauma were identified as the leading risk factors, aligning with global trends emphasizing the need for better contact lens hygiene and eye protection.

## Microbiological Spectrum

Bacterial infections were the most common etiology, with Gram-positive bacteria predominating, similar to findings in other regions. The presence of fungal infections, particularly Aspergillus and Fusarium species, underscores the significance of fungal keratitis, especially in agricultural workers exposed to organic matter.

The incidence of viral keratitis, primarily due to Herpes Simplex Virus, reflects the importance of recognizing viral causes in recurrent or non-healing ulcers.

## Management Strategies

**Medical Management**: The majority of cases responded well to topical antimicrobial therapy, highlighting the effectiveness of early and appropriate pharmacological intervention. The tailored approach, based on microbiological findings, was crucial in achieving satisfactory outcomes.

**Surgical Intervention**: Surgical procedures were reserved for cases with poor response to medical treatment or severe complications. Therapeutic keratoplasty and amniotic membrane transplantation were effective in managing advanced cases, emphasizing the need for timely surgical intervention in refractory cases.

## Visual Outcomes

The improvement in visual acuity across follow-up visits demonstrates the success of the management strategies employed. However, patients with deep ulcers or central involvement had relatively poorer visual outcomes, indicating the need for ongoing monitoring and rehabilitation.

## Limitations

This study's limitations include its single-center design and the potential for referral bias. Future multicenter studies with larger sample sizes and longer follow-up periods are warranted to validate these findings and explore emerging trends in corneal ulcer management.

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# Conclusion

Corneal ulcers remain a significant public health concern, necessitating a multifaceted approach encompassing early diagnosis, targeted therapy, and, when necessary, surgical intervention. This study highlights the importance of comprehensive care in managing corneal ulcers and underscores the need for preventive strategies to reduce the incidence and improve outcomes in affected populations.

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# References


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