

Study of Fungal Corneal Ulcer in Patients Visiting Tertiary Hospital

Anupama Raju Taklikar¹, Sneha G Vasanth², Pooja Rathod³

Abstract

Background and Aim: Corneal ulcer is a major public health problem in the developing world causing prolonged ocular morbidity and visual impairment. In a vast agricultural country like India, minor eye injuries sustained in agricultural farms often lead to corneal ulceration of fungal etiology and loss of vision. Hence, this study was undertaken to study the risk factors, clinical presentation and to know the statistical significance regarding the common type of fungi and prognosis with regard to the available mode of therapy.

Materials and Methods: All patients with suspected corneal ulcer presenting to NMCH&RC, Raichur, Department of ophthalmology from September 2017 to March 2019 were evaluated. Detailed history was taken and thorough ocular and systemic examination with Microbiological work up was done in all patients. They were given necessary medications. Outcome was recorded in terms of regression of symptoms and development of complications.

Results and Conclusion: Out of 120 patients with suppurative keratitis, 75 (62.50%) were clinically suspected of mycotic keratitis and positive for fungal elements. 89.3% were in the working population. 50.67% were farmers. Trauma with vegetative matter was a predisposing factor in 40% of the cases. All patients were KOH positive and among them 70.66% were culture positive. In our study *Aspergillus* (46.7%) was the most commonly isolated fungus. In all 75 patients ulcer debridement was done.

Keywords: Fungal corneal ulcer; KOH sensitivity; *Aspergillus*. Sp; Antifungal treatment; Surgical debridement.

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Introduction

Corneal ulcer is a major public health problem in the developing world causing prolonged ocular morbidity and visual impairment.¹

Corneal blindness is responsible for 1.5 to 2 million new cases of monocular blindness every year in which ocular trauma and corneal ulceration are major contributors.²

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The reported incidence of corneal ulceration in India is 1130 per million Population.³

Suppurative keratitis is the leading cause with mycotic keratitis constituting half of the cases in south India. Difficulties encountered in establishing clinical diagnosis are, in isolating the etiologic fungal organism and in treating keratitis with antimycotic agents. Morbidity in mycotic infection tends to be higher compared to bacterial keratitis because diagnosis is often delayed due to negligence towards ocular trauma, inappropriate treatment and wide spread use of topical antibiotics and steroids for any case of corneal ulcer. Corneal infections of fungal etiology are common in India (19-45%).

Aspergillus (16-53%) and *Fusarium* (10-45%) are the common incriminating pathogens.¹ Due to present increase in awareness of the fungal lesions, improved

clinical facilities in examining microbiological techniques of growing organisms and proper identification, more and more cases are becoming positive.

In a vast agricultural country like India, particularly where primary health care and referral systems are weak, minor eye injuries sustained in agricultural farms often lead to corneal ulceration of fungal etiology and loss of vision.⁴

Factors like malnutrition, anaemia, alcoholism, and illiteracy, lack of knowledge, lack of facilities, unawareness of facilities, malpractice and ignorance predispose the person to fungal infection. Hence fungal infection of the cornea poses a big problem and therefore there is special need for study.

NMCH & RC Raichur, being major referral center, we get more than two–three cases of mycotic keratitis per OPD. Considering its prevalence it is thought worthwhile to take up clinical study of mycotic keratitis to diagnose the case on suspicion with laboratory investigation and to start antimycotic treatment early for better results.

Materials and Methods

The study was conducted in Dept of ophthalmology, NMC from Sept 2017-Mar 2019.

Inclusion criteria

75 Patients coming to ophthalmology OPD with clinical features suggestive of fungal keratitis such as long duration, elevated, plaque like feathery margins of the ulcer, raised slough, dry surface, satellite lesions, Weiss ring, endothelial plaque, coloration of the ulcer other than yellow (suggestive of diamatious fungi) and thick hypopyon were noted and categorized as patients with fungal keratitis.

Exclusion criteria

Non suppurative keratitis including viral keratitis, neurotrophic ulcers, degenerative causes, moorens ulcer, interstitial keratitis, sterile neurotrophic ulcers and any ulcer associated with systemic autoimmune conditions.

Cases of corneal ulcer who presented with excessive corneal thinning and impending perforation, as well as perforated corneal ulcers were excluded, as taking a corneal scraping and subsequently establishing a microbiological etiological diagnosis was not feasible in such patients.

Non compliant patients as regards proper

treatment schedule and regular follow up.

After selection of patients, standardized proforma was filled for each patient documenting, Age, Sex, Domicile, Occupation and Predisposing factors including history of Trauma. Detailed clinical history was taken and any previous usage of medications recorded.

Clinical procedure

Visual acuity was recorded in standard manner. All patients were subjected to a detailed slit lamp biomicroscopic examination. Size of ulcer was roughly recorded with fluorescent stain under local anesthesia. Depth of the lesion, stromal infiltrate, ulcer margin, thinning, floor, satellite lesions, vascularity, pigmentation, any impacted foreign body and hypopyon were noted.

Associated ocular conditions like Blepharitis, Conjunctivitis, Dacryocystitis,

Spheroidal degenerations, Bullous keratopathy, Dry eyes, Pre-existing viral keratitis, Lid abnormalities, Bells palsy, Lagophthalmos, Trichiasis, Suture infiltrates, adherent Leucoma were noted. Usage of contact lenses, topical corticosteroids or any other topical or systemic medications were noted.

Material was collected from conjunctiva, sac area and corneal ulcer scrapings. Materials used by patients (eye drop bottles), were collected. The collected material was submitted for Gram staining, Giemsa staining and KOH wet mount preparation and PAS staining. Fungal elements are observed under microscope. Rest of the material was sent for culture.

Remaining scrapings were utilized for his to pathology By convention to indicate the site of inoculum on a solid medium, harvested material is inoculated in the form of a 'C' streak on each medium from separate scrapings. Almost all fungal isolates grow & become evident in 48-72 hrs. Cultures were examined daily up to one week before declaring a culture, negative for fungi.

Anyone of the following criteria if fulfilled suggest a significant growth

1. If smear results are consistent with culture
2. The organism is grown on more than one media
3. Growth of the same fungus in decreasing gradation at multiple sizes of inoculation on the solid medium.

Observation and Results

The clinical study of mycotic keratitis, conducted in the department of ophthalmology, Navodaya Medical College Hospital and Research Centre from September 2017 to March 2019.

During this period, the following observations were made.

Table 1: Distribution of mycotic keratitis.

Total Number of Patients with Suppurative Keratitis	Clinically Suspected mycotic keratitis	Percentage
120	75	62.50%

Out of 120 patients with suppurative keratitis, 75 (62.50%) were clinically suspected of mycotic keratitis and positive for fungal elements. Thus the total number of cases included in the present study was 75(62.50%) patients.

Table 2: Age distribution.

Age	No. of cases	Percentage
= 20	7	9.3
21 - 40	34	45.3
41 - 60	33	44
> 60	1	1.3
Total	75	100

In the present study of mycotic keratitis, Out of 75 cases majority of these cases belong to 20 to 40 years of age group (45.3%), followed by 40-60 years of age group (44%), No cases were, however, recorded below 10 yrs of age; in this series, the youngest patient was 13 years old and the oldest patient was 65 years old.

Table 3: Occupational preponderance.

Occupation	No. of cases	Percentage
Agriculture labour	38	50.67
Industrial labour	13	17.33
Home maker	8	10.67
Others	16	21.33
Total	75	100

In present study of mycotic keratitis, Majority were agricultural workers 38(50.67%) , followed by industrial workers 13(17.33%), Housewife 8 (10.67%). And others (like students, teacher, Clerk) accounted for 16 (21.33%).

Table 4: Predisposing factors for mycotic keratitis.

Predisposing factors	No. of cases	Percentage
Finger nail	4	5.3
Vegetative matter	30	40
H/O FB fall	26	34.7
Subcutaneous/Nil	15	20
Total	75	100

In the present study of mycotic keratitis, prior injury with Vegetative matter accounted for 30 cases (40%). Other modes of injury were Foreign body fall accounted for 26 cases (34.7%), trauma with finger nail in 04 cases (5.33%), and spontaneous injury in 15 cases (20%)

Table 5: Fungal culture results.

Fungal culture	No. of cases	Percentage
Arthroconidia	1	1.3
Aspergillus	35	46.7
Fusarium	17	22.7
No growth	22	29.3
Total	75	100

$\chi^2 = 31.613$ $P = 0.000 < 0.01$ HIGHLY SIGNIFICANT

Fungal culture was positive in 53 (70.66%) patients. After 15 days of inoculation on the SDA medium in 35 (46.7%) patients Aspergillus was isolated.

In 17 (22.7%) fusarium was the species to be isolated on SDA medium. 1(1.3%) patient had arthroconidia growth on SDA medium. In 22(29.3%) patients no growth occurred.

Table 6: Medical management.

Medical Mx Topical	No of cases	Percentage
Natamycin	50	66.7
Natamycin + Moxifloxacin	21	28
Natamycin + Moxifloxacin + Voriconazole	4	5.3
Total	75	100

All patients were put on topical natamycin 5% eye suspension. Among them 66.7% were on natamycin only; 28% were on natamycin 5% and moxifloxacin 0.5% eye drops. 5.3% patients were treated with natamycin 5%, voriconazole 1% and moxifloxacin 0.5% eye drops.

Table 7: Outcome of mycotic keratitis.

Outcome	No. of cases	Percentage
Healing	64	85.33
Perforation	3	4
Secondary glaucoma	6	8
Non healing	2	2.67
Total	75	100

Among 75 patients, 64(85.33%) healed with corneal opacity, 3 (4%) had perforation of the cornea and 6(8%) developed secondary glaucoma and 2(2.67%) were non healing and underwent therapeutic penetrating keratoplasty.

Discussion

The World Health Organization has recognized that corneal blindness resulting from microbial keratitis is emerging as an important cause of visual disability.⁵

Corneal ulceration has been recognized as a "silent epidemic" in developing countries, especially the South East Asia Region.⁶ Extrapolating the Indian estimates further to the rest of Africa and Asia, the number of corneal ulcers occurring annually in the developing world quickly approaches 1.5-2 million, and the actual number is probably greater.

The various demographic factors were studied and it was found that most of the corneal ulcers are seen in farmers (50.67%) and from rural areas (88%). Especially who have trauma to the eye with vegetative matter (40%).

Mycotic keratitis has tendency to progress slowly with minimal symptoms hence the patients are provoked to apply local native medicines and approach the doctor very late.

Lack of laboratory identification especially in peripheral hospital adds to the problem.

In this study *Aspergillus* was the most common species among the culture positive cases followed by *Fusarium* species. Natamycin is the chief topical antifungal agent in the limited armamentarium of the clinician to fight the menace of fungal corneal ulcer.

Fortunately, majority of them (85.33%) healed with intensive therapy and sustained follow up.

Gonzales et al. found that the annual incidence of corneal ulceration in Madurai District in South India was 11.3 per 100000 people⁷-10 times the annual incidence of 11 per 100000 reported from Olmsted County, Minnesota, in the United States of America.⁸ By applying the 1993 corneal ulcer incidence rate in Madurai District to all of India, there are an estimated 840000 people a year in the country who develop an ulcer. This figure is 30 times the number of corneal ulcers seen in the United States.⁸

In a prospective population-based study by Upadhyay et al. in Bhaktapur District, Nepal, the annual incidence of corneal ulceration was found to be 799 per 100000 people.⁹

This extraordinarily high rate is seven times the incidence reported in South India and 70 times the rate in the United States. These findings suggest that corneal ulceration maybe much more common in developing countries than previously recognized and that epidemics similar to that in Nepal may currently be occurring on a global scale.

Suppurative keratitis and its complications constitute important causes of ocular morbidity often leading to blindness if early management is not instituted. A proper history coupled with detailed clinical examination would be beneficial to clinically identify the predisposing factors for corneal perforation in microbial keratitis.

Proper management and treatment of fungal corneal ulcers, a major cause of blindness world wide requires precise identification of the aetiology so that an appropriate antifungal agent targeting the organism responsible can be administered on time.

Nonetheless, the inconsistency in prevalence and causes of corneal blindness across geography and ethnic groups make it challenging to administer a standard set of protocols in order to lower the incidence of corneal ulcer.⁹ Given these milieu, the awareness among ophthalmologists of regional epidemiological features, risk factors, and etiological data concerning this ophthalmic condition is necessary. Thus, we explored the etiological agent of corneal ulcer, identified associated risk factors and antifungal susceptibility of fungal isolates were identified.

Conclusion

Fungal corneal ulcer continues to be an important cause of corneal morbidity.

India being an agricultural country, the incidence of mycotic keratitis is significantly high, mainly in the working age group i.e., 21 to 60 years (89.3%).

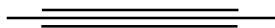
This study signifies the importance of keeping in mind fungus as one of the inflicting agent in causation of corneal ulcer especially when predisposing factors like corneal trauma with organic matter, are present and also by looking at the clinical features.

With timely specific treatment, one can combat the disease efficiently and thus prevent the eye going in for blindness.

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