Original Article

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Spectrum of Corneal Ulcers: A Descriptive Study

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Abstract

Introduction: Corneal ulcer is one of the most common causes of prolonged ocular morbidity and visual impairment in our country. While cataract remains the major cause of reversible visual loss, diseases of the cornea are emerging as an important cause of visual impairment. Corneal lesions were found to be responsible for 9% of all blindness in our country, in a recent national survey by government of India.1 The reported incidenceofcorneal ulceration in South India is 1130 per million population. *Objectives:* To know the etiology of corneal ulcers based on laboratory investigations done in our hospital regarding the type of pathogen and to determine the most common predisposing factor for corneal ulceration. *Methods:* This cross-sectional descriptive study included fifty patients attending Ophthalmology Outpatient Department in NRI medical College and Hospital with corneal ulcers during a period of one year i.e. July 2016 to June 2017. They were examined by slit-lamp and corneal scrapings were performed for cultures and smears by using standard protocols. *Results*: Corneal ulcers are more common inrural population in the age group of 41-60 years. Males are most commonly affected than the females. In 88% patients predisposing factors like injury with vegetative matter, animal material and stone are present. Most of the corneal ulcers are peripherally located and up to mid-stromal involvement. 64% patients had only fungal positive, 30% patients had only bacteria positive and 3 cases were identified as viral corneal ulcers by clinical examination. Among 50 patients 47 patients (94%) healed with corneal opacity. *Conclusion*: Most of the corneal ulcers are seen in the rural population especially farmers who have trauma to the eye with vegetative matter. In this study *Fusarium* was the most common species among the culture positive cases followed by *Aspergillus* species among the fungi. Among the bacteria *Staphylococcus epidermidis* is the most common species followed by *Staphylococcus aureus* and *Pseudomonas* species.

Keywords: Corneal Ulcer; Keratitis; Corneal Scrapings; Culture; Bacteria; Fungi.

Introduction

Corneal infection is a leading cause of ocular morbidity and blindness worldwide [3-8]. Corneal ulcer is one of the most common cause of prolonged ocular morbidity and visual impairment in our country. While cataract remains the major cause of reversible visual loss, diseases of the cornea are emerging as an important cause of visual impairment.Corneal ulceration is a major cause of mono-ocular blindness in developing countries. Surveys in Africa and Asia have confirmed these findings [3-8], and a recent report on the causes of blindness worldwide consistently lists corneal scarring second only to cataract as the major etiology of blindness and visual disability in many of the developing nations in Asia, Africa and the Middle East [9]. Ocular trauma and corneal ulcers annually results in 1.2 to 2 million cases of corneal blindness globally with 90% of them occurring in developing countries [10]. Corneal lesions were found to be responsible for 9% of all blindness in our country, in a recent national survey by government of India [1]. The reported incidence of corneal ulceration in South India is 1130 per million population [2]. In tropical countries like India, corneal ulcer presents as one of

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the major ophthalmic problems. It is very common to see the corneal ulcer even after minor trauma to the eye. If diagnosed and treated early the results are better. Successful treatment of this condition depends upon accurate and rapid identification of the causative organism. We have taken up the study to know the etiology of corneal ulcers basing on investigations done in our hospital regarding the type of pathogen and to determine the most common antecedent factor predisposing to onset of corneal ulceration.

Objectives

To know the etiology of corneal ulcers based on laboratory investigations done in our hospital regarding the type of pathogen and to determine the most common predisposing factor for corneal ulceration.

Materials And Methods

This cross-sectional descriptive study was taken up after taking the approval of Institutional Ethics Committee. 50 patients with the corneal ulcer attending the Outpatient Department of Ophthalmology at NRI General Hospital were included in the study after taking their consent for participation in the study. Patients who are non-compliant and not available for follow up were excluded from the study. Corneal ulceration was defined as loss of corneal epithelium with underlying stromal infiltrate and suppuration associated with signs of inflammation, with or without hypopyon [11]. Each patient was subjected to a detailed history taking. In most of the cases visual acuity where possible was measured using Snellen's chart and all patients underwent thorough slit-lamp bio-microscopic examination by an Ophthalmologist and noting the size of ulcer depth and extent of infiltrations, presence or absence of hypopyon, scleral extension and corneal thinning were noted after staining with wet sterile fluorescein paper strip. Local eye conditions predisposing to corneal ulcerations like lag-ophthalmos, dacryocystitis, trichiasis, dry eyes, surgery and corneal opacity or degeneration were noted. After a detailed ocular examination corneal scrapings were performedunder aseptic conditions by an Ophthalmologist after instillation of 0.5% proparacaine hydrochloride solution using a sterile No. 15 Bard Parker blade from the base of the ulcer as well as from the margins of the corneal ulcer [12]. Corneal material from scraping the ulcer was smeared for Gram's stain, 10% KOH preparation and inoculated on blood agar for culture of bacterial isolates and incubated at 37^0C were evaluated at 24 hours and 48 hours and then discarded if no growth was seen. Sensitivity was done using disc diffusion method iforganisms were isolated. For fungal culture the scrapings were directly inoculated on two slants of Saboraud's dextrose agar medium and incubated at 27^0C, examined daily and discarded at 3 weeks if there were no signs of growth.

Results

Out of 50 corneal ulcer patients 29 (58%) were males and 21 (42%) were 24 patients (48%) were 41-60 years of age,19 (38%) were 21-40 years of age, 4 (8%) were <20 years of age and 3 (6%) were >60 years of age. Majority of patients were in age group of working population i.e from 21-60 yrs. It was least in very young and old patients (Table 1).

Table 1: Age distribution of patients

Age Distributjion of Patients		
Age (Yrs)	**No.**	**%**
<20	4	8
21-40	19	38
41-60	24	48
>60	3	6
Total	50	100

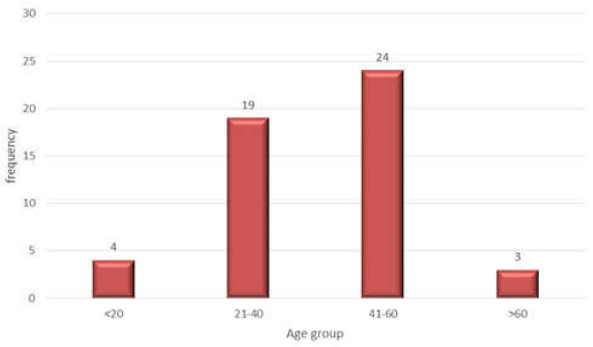

Fig 1: Distribution of study subjects according to age group

24 (48%)of the subjects belong to the productive age group of 41-60 (Fig. 1).

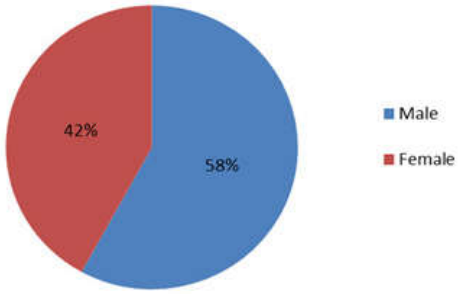

Fig 2: Sex distrubution of the study subjects

58% of the study subjects were males (Fig. 2)

Table 2: Occupation ofpatients with corneal ulceration

Occupation of the Patients		
Occupation	**No.**	**%**
Agriculture	34	68
Homemaker	3	6
Carpenter	2	4
students	5	10
Others	6	12
Total	50	100

Most (68%), of the patients were farmers followed by students who constituted 10% (Table 2).

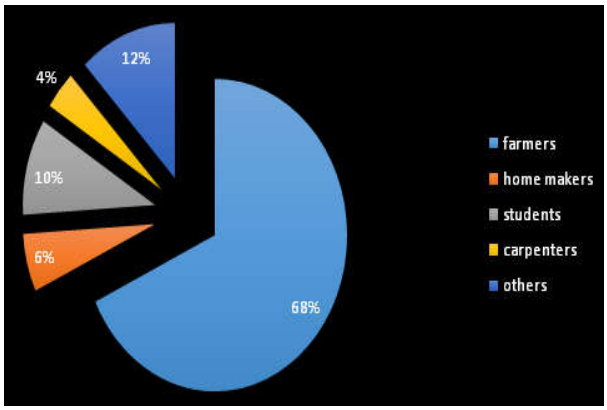

Fig. 3: Occupation of patients with corneal ulceration

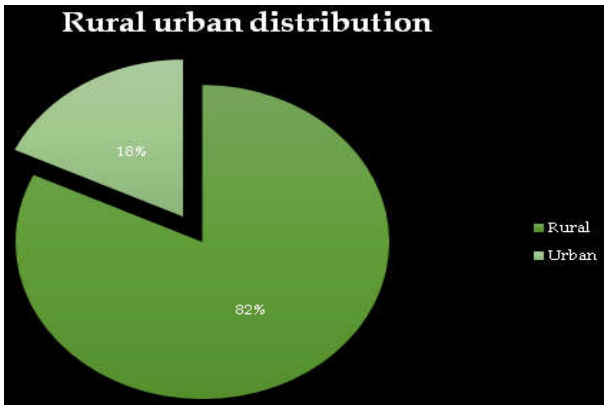

Fig. 4: Pie diagram showing rural and urban distrubution

82% were from rural areas whereas the rest were from urban areas (Fig. 4)

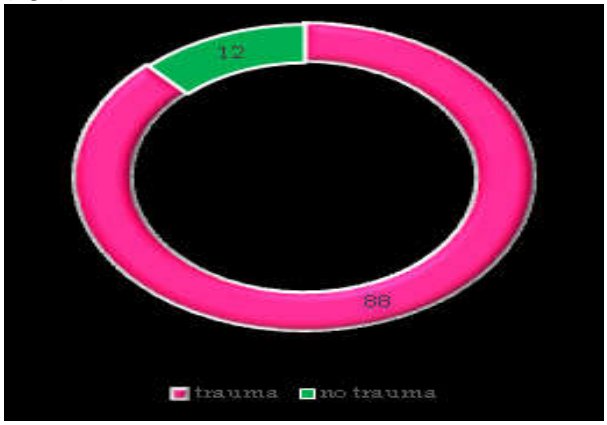

Fig. 5: Distribution of patients according to history of trauma

In 88% of the patients with corneal ulcers there was a history of trauma (Fig. 5).

Table 3: Showing the risk factors for corneal ulcer

Risk factor	No.	%
Vegetative matter	33	75
Stone	6	13.6
Animal agents	5	11.4
Total	44	100

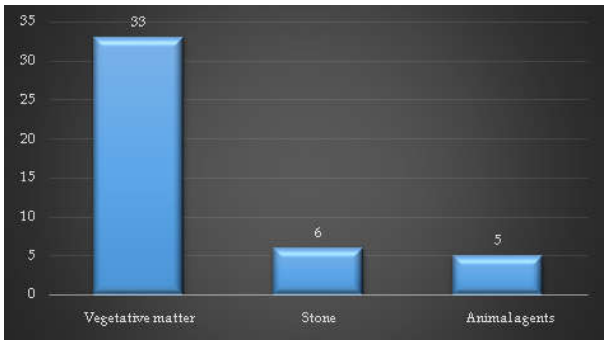

Fig. 6: distribution of the patients according to the type of risk factor

Many patients gave history of trauma to the eye with various agents. 75% of patients had trauma with vegetative matter.12% gave history of fall of stone into the eye. 10% had history of trauma with animal agents like cow tail and finger nail. (Fig. 6)

Table 4: Gram's stain report at first visit.

Gram Stain	No.	%
F	32	64
B	15	30
Not done	3	6
Total	50	100

B- Bacteria, F – Fungal Elements

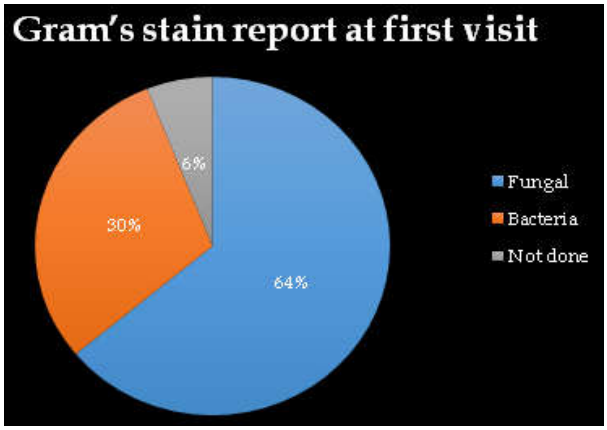

Fig. 7: Gram stain report at first visit.

Fungal culture was positive in 32 (64%) patients and bacterial culture in 15 (30%) patients (Fig. 7).

Table 5: Pathogens isolated from corneal ulcers (n=50)

Etiological Agents	No.	%
Fusarium	18	36
Aspergillus flavus	8	16
Aspergillus fumigatous	6	12
Staphylococcus aureus	4	8
Staphylococcus epidermidis	9	18
Pseudomonas aeruginosa	2	4
Viral	3	6
Total	50	100

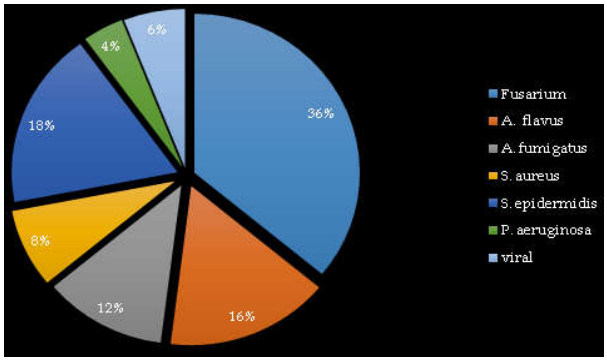

Fig. 8: Pathogens isolated from corneal ulcers.

Table 6: Depth of Infiltration

Depth of infiltration	No.	%
Anterior stroma	16	32
Mid stroma	28	56
Full thickness	6	12
Total no. of patients	50	100

56% of the patients had mid stromal involvement, while 32% had anterior stromal involvement (Table 6).

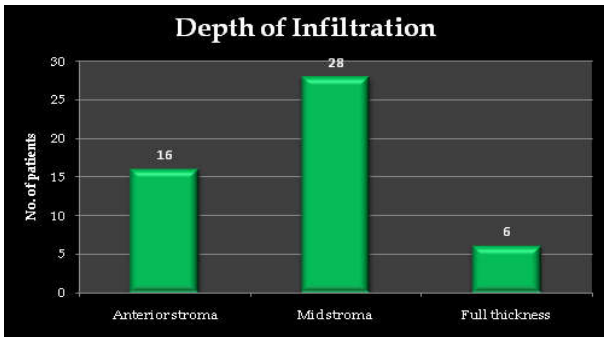

Fig. 9: Depth of infiltration

In this study 56% of study subjects had mid stromal involvement followed by 32% anterior stromal involvement and in 12% of the study subjects full thickness of the cornea was involved (Table 9).

Discussion

Corneal ulcer is a sight threatening disorder presenting in all age groups and either sex world wide. In this study majority of patients were in the working population i.e 41-60 years (48%), followed by 21-40 yrs, >60 yrs and <20 yrs. In Nath et al. study the commonest age group was between 41-50 years which was in agreement with the present study [13]. This has a our considerable socioeconomic impact because this age group people are bread winners of the family. In similar other studies the commonest age group was 31-40 yrs. Regarding the gender of the patients, in this study males (58%) were affected more than females (42%). In other similar studies male preponderance ranged between 65 to 68%. By the nature of their work profile men are more exposed to outdoor activities thereby increasing their vulnerability to the disease. In this study farmers (68%) homemaker (6%), other professions like students (10%), carpenters (4%) and others (12%) which includes other occupations like tradesmen and unemployed individuals. In Bharathi et al. study, [12] farmers contributed to 64.75%, homemaker 5.11%, students 8.11%, tradesman 6.48%, unemployed 1% and labourers 14.52%.

This occupational preponderance was justified because trauma with vegetative matter was an important risk factor for the occurrence of infective keratitis, especially fungal. In this study 41 (82%) were from rural areas whereas the rest of the 9 (18%) were from urban areas.

Table 7: Comparison of rural- urban distribution in different studies.

	Bharathi et al[12] study	Nath R et al[13] study	Present study
Rural	80.27%	87.9%	82%
Urban	19.73%	11.5%	18%

This data coincided well because patients involved in agricultural activity were more commonly from rural area (Table 7).

It is of interest that over 68% of the patients in the study presented for examination during the second week is similar with findings in Nepal [14]. Majority of patients (82%) presented only after 6 days of symptoms. In Bharathi et al. study [12], 46.66% patients reported within 7 days. There was history of trauma in 88% patients with various agents like vegetative matter (75%), stone (13.6%) and other agents like animal tail and finger nail (11.4%). 72% patients had trauma with vegetative matter because most of these patients were engaged in agricultural activity. In Bharathi et al [12] study 92.15 percentage patients had corneal trauma and among them 61.28% were by vegetative matter.

In 12% of the patientsfull thickness of the cornea was involved, 32% had anterior stromal involvement and 56% had mid-stromal involvement. Out of the 6 patients who had full thickness involvement of the cornea, 2 patients eventually had perforation of the cornea at 3-4 weeks inspite of treating with systemic antifungals. The corneal ulcers with anterior stromal involvement started healing earlier (1-2 wks) than the other groups.

Almost 64% of all corneal ulcers with positive cultures were fungal in origin. This figure approaches the fungal isolation rate by Hagan et al. [15] (56%) and Srinivasan et al. [11]. (51.9%).

Table 8: Comparison of common organisms in different studies.

Study	Bharathi et al[12]	Chowdhary et al[16]	Gopinathan etal[15]	Present study
Most common organism	Fusarium	Aspergillus	Fusarium	Fusarium

In this study, Fusarium is the most common organism (36%) the next common organism was Aspergillus flavus (16%), followed by Aspergillus fumigatus (12%). In Chowdhary et al. [16] study, Aspergillus niger was found to be the most common fungal species.

Conclusions

The various demographic factors like age, sex and population were studied and it was found most of the corneal ulcers are seen in the rural population especially farmers who have trauma to the eye with vegetative matter.

KOH mounts were in agreement with fungal culture in 64% of cases and so it can be used as a quick and reliable method to find out fungal etiology of corneal ulcers and treatment can be started immediately without waiting for the culture reports to arrive. Grams staining is a reliable and fast method to suspect bacterial etiology. In this study *Fusarium* was the most common species among the culture positive cases followed by *Aspergillus* species among the fungi. Among the bacteria *Staphylococcus epidermidis* is the most common species followed by *Staphylococcus aureus* and *Pseudomonas* species.

The study shows that in ulcers with deep stromal involvement, only 50% showed signs of healing which again stresses the importance of early recognition of the correct etiology.

Summary

- In this study majority of patients (48%) were in the working population i.e 41-60 years
- Among the patients 58% were males.
- Most of the patients were farmers (74%) and from rural areas (82%).
- Trauma with vegetative matter was a predisposing factor in 75% of cases.
- 12% cases had full thickness involvement of the cornea.
- 64%patients were KOH positive and among them all are culture positive.30% are bacterial and all are culture positive.

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