Retrospective analysis of microbiological profile of patients with infective keratitis: North Indian perspective

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Abstract

Introduction: Infectious keratitis is among the leading causes of preventable blindness in developing countries. The epidemiological profile of infectious keratitis vary significantly from country to country and even area to area within the same country.

Aim: This study was conducted to know the epidemiological pattern, predisposing risk factors involved and microbiological profile of the patients with corneal ulcer.

Materials and Methods: A retrospective analysis of all the patients presenting to MMIMSR eye opd with corneal ulcer between Jan 2016 to June 2018 was done. The demographic data as well as epidemiological profile including history of trauma, duration of symptoms, predisposing risk factors, time taken to present to hospital was collected. The diagnosis was made based on clinical findings on Slit lamp examination as corneal epithelial defect with stromal infiltrate and microbiological investigations.

Results: There were a total of 234 patients documented to have corneal ulcer. The mean age of presentation was 46 ± 18 years. Only 20 (8.6%) presents within a week of symptoms and 122 patients (52.1%) presented within 2 to 4 week of symptoms. A history of ocular trauma was present in about 150 patients (64%) out of which trauma with vegetative matter in 88 (58.67%) patients and trauma with non vegetative matter in 51 (34%) patients. Corneal scrapping was positive in 185 patients (79.04%) with KOH mount being positive in 152 patients (64.95%). Gram stain was positive for bacteria in 21 patients (8.97%) and 12 (5.12%) patients reported both bacteria and fungus. In 47 patients (20.08%), no organism was reported. Among the gram positive isolates, Staphylococcus epidermidis was the most frequent species. The most common fungal isolate reported was fusarium in 49 patients (26.48%) followed by Aspergillus in 19 patients (10.27%).

Conclusion: Infective keratitis is a common cause of ocular morbidity with fungal corneal ulcer being the most frequent ulcer. Fusarium species in fungal corneal ulcer and staphylococcal epidermidis in bacterial corneal ulcer were the common isolates. A lack of knowledge about the magnitude of the problem, financial limitations and topographical constrains were implicated in delayed presentation to a health center.

Keywords: Corneal ulcer, Corneal opacification, Infective keratitis, Ocular trauma, Preventable blindness.

Introduction

Infectious keratitis is among the leading causes of preventable blindness in developing countries. It has been labeled as a "silent epidemic" in underprivileged countries.[1] Corneal opacification is a major cause of visual impairment after cataract in many parts of the world like Middle East, Asia and Africa.[2-5] Various studies showed variations in the incidence of corneal ulceration with United States showing incidence rate of 11 per 100,000 in a year,[6] India with incidence rate of 113 per 100,000 in a year[3] and Nepal with 799 per 100,000 / year.[7] The epidemiological profile of infectious keratitis vary significantly from country to country and even area to area within the same country. The various studies have shown the prevalence of different types of infectious keratitis in various parts of the world.[8] The diagnosis of keratitis relies on a thorough history, epidemiological pattern and its morphological features.[7] So it is very important for every hospital to develop a strategic approach for the diagnosis, timely management and prevention of infectious keratitis. This study was conducted to know the epidemiological pattern, predisposing risk factors and microbiological profile of the patients with corneal ulcer.

Materials and Methods

A retrospective analysis of all the patients presenting to MMIMSR eye opd with corneal ulcer between January 2016 to June 2018 was done. Corneal ulcer was diagnosed as loss of corneal epithelium with underlying stromal infiltration with signs of inflammation with or without hypopyon. The demographic data as well as epidemiological profile including history of trauma, duration of symptoms, predisposing risk factors, time taken to present to hospital was collected. The diagnosis was made based on clinical findings on Slit lamp examination as corneal epithelial defect with stromal infiltrate and microbiological investigations. The referred patients of corneal ulcer who were on topical antibiotics with negative cultures were included if their clinical picture was suggestive of infectious corneal ulcer. Visual acuity (VA) of these patients was divided into four categories (as per WHO guidelines): those between 6/6 to 6/18 (acceptable), 6/24 to 6/60 (moderate visual impairment), < 6/60to 3/60 (severe visual impairment)

and < 3/60 (blind). All patients underwent a detailed slit-lamp examination and the corneal staining was done by putting fluorescence strip in the lower conjunctival fornix and the cornea was then examined with cobalt blue filter. The epithelial defect size was measured and recorded in millimeters and diagram of each ulcer was made and presence of hypopyon if any was also noted. Associated ocular pathology like blepharitis, dry eyes, dacryocystitis, lagophthalmos, contact lens use, ocular leprosy, corneal anesthesia and use of topical steroids were also documented.

All the patients underwent detailed ocular examination of eyelids and cornea under slit lamp and scraping of the cornea was taken (under LA like proparacaine 0.5%) using sterile Bard-Parker knife from the leading edge and base of the ulcer. The sample obtained was inoculated into blood and chocolate agar media, stained for Gram stain and KOH wet mount. Statistical analysis was done using Microsoft excel 2016 Ed.

Results

There were a total of 234 patients documented to have corneal ulcer during our study period out of which 140 (59.8%) were males and 94 (40.1%) were females. The mean age of presentation was 46 ± 18 years with fourth to sixth decade being the most common age group having about 79% of patients in this age group. Only 20 (8.6%) presents within a week of symptoms. About 122 patients (52.1%) presented within 2 to 4 week of symptoms (Table 1). The delayed presentation was due to financial limitation, unawareness about severity of the problem and topographical constrains to seek health care. Of all the patients presenting to our institute, about 176 patients (75%) were already putting some medications in the form of topical antibiotics eye drops in 22 (12.5%), antifungal eye drops in 12 patients (6.8%), both antibiotics and antifungal in 35 (19.8%) patients and steroids in 08 (4.5%) patients. A history of ocular trauma was present in about 150 patients (64%) with trauma with vegetative matter (like grass, hay, sugarcane and leaf) in 88 (58.67%) patients and trauma with non-vegetative matter in 51 (34%) patients (Table 3).

The visual acuity at presentation was <6/60 in 150 patients (64.1%), 32 patients (13.6%) had visual acuity between 6/6 to 618 and 52 (22.2%) had visual acuity between 6/18 to 6/60. Out of 234 patients, 86 patients (36.7%) had hypopyon at presentation. Corneal scrapping was positive in 185 patients (79.04%) with KOH mount being positive in 152 patients (64.95%). Gram stain was positive for bacteria in 21 patients (8.97%) and 12 (5.12%) patients reported both bacteria and fungus. In 47 patients (20.08%), no organism was reported. In 02 patients (0.8%), corneal scraping was not done due to risk of perforation (Table 2). Among the gram positive isolates, Staphylococcus epidermidis was the most frequent species followed by staphylococcus aureus (Table 4) and among Gram negative organisms pseudomonas aeruginosa was the common species. The most common fungal isolate reported was fusarium in 49 patients (26.48%) followed by Aspergillus in 19 patients (10.27%). Mixed bacterial and fungal isolates was noticed in 12 (6.48%) (Table 4)}

Table 1

Duration of illness	No. of patients	%age
< 1 week	20	8.6%
7 to 14 days	66	28.2%
15 to 30 days	122	52.1%
>1 month	26	11.1%
Total	234	100%

Table 2: Microbiological growth pattern in 234 corneal ulcer patients

Pattern of growth	No. of cases (n)	%age
Bacteria	21	8.97%
Fungus	152	64.95%
Mixed	12	5.12%
No organism	47	20.08%
Not done	02	0.83%
Total	234	100%

Table 3: Predisposing risk factors in 150 patients of total 234 patients

Predisposing factor	No. of patients	%age
Trauma		
Vegetative matter	88	58.67%
Non vegetative matter	51	34%
Dacryocystitis	08	5.3%
Other Ocular disorder	03	2%
Total	150	100%

Table 4: Bacterial and fungal isolates from corneal ulcer

Organism	Single species isolates	%age
Staphylococcus epidermidis	11	5.94%
Staphylococcus aureus	04	2.16%
Staphylococcus pneumonia	03	1.62%
Streptococcus viridans	01	0.54%
Pseudomonas aeroginosa	02	1.08%
Fusarium species	49	26.48%

Aspergillus species	19	10.27%
Candida	08	4.32%
Unidentified dematicious fungi	48	25.94%
Unidentified hyaline fungi	28	15.13%
Mixed Bacterial and fungal growth	12	6.48%
Total	185	100%

Discussion

Corneal ulceration is one of the major causes of blindness in underprivileged countries. Corneal scarring is next to cataract in causing visual disability in the world.[1,9-12] Since ours is a tertiary center catering to adjoining rural areas and most of the population is involved in harvesting and about 128 patients (54.7%) of total 234 were farmers. The similar occupational profile was noticed in a study conducted in West Bengal and southern India[9,13] in comparison to a study done in Ghana which reported only 16.1% of patients being farmers.[14] About 122 patients (52.1%) in our study presented in 2 to 4 weeks of symptoms and only 20 patients (8.6%) presented within a week of symptoms in contrast to a study conducted in south India, 60% of the patients reported within a week time[9] while the study conducted by Dhakhwa et al[15] noticed 43.2% of the patients presented within 2 to 4 weeks. In our study, the microorganisms were isolated in about 185 patients (79.7%) which is analogous to a study done by Upadhaya et al.[16] The study done by Dhakhawa et al[15] reported culture positivity in 72.5% of the patients. Of all the patients with corneal ulcers, 152 (64.9%) showed positive culture which were fungal in origin. This figure is higher than the fungal isolation rate in the study by Srinivasan et al who reported 46.8% and Hagan et al reported 51.9% while the study by Sitoula RP et al[17] reported 70% culture positivity for fungus. The study by Lavaju et al[18] reported 20% culture positivity for fungus. Among the fungal positive cultures, 26.48% were fusarium species, 10.27% were Aspergillus species, unidentified dematicious fungi in 25.94% and unidentified hyaline fungi in 15.13%. The similar results were reported by Srinivasan et al where fusarium was the commonest identified fungus. In a study by Dhikhawa et al, the frequency of fungal culture positivity was Fusarium species (30.73%), Aspergillus species 18 (10.06%), dematiceous fungi (57;31.84%) and unidentified Hyaline fungi (22 i.e.12.29%). In a study by Upadhyaya et al, Basak et al (2005) William et al., Aspergillus species was the most common fungal isolate.[18] Of total 21 bacterial isolates, staphylococcus epidermidis was present in 52.3% and was the commonest followed by Staphylococcus aureus while in the study by Dhikhawa et al out of 186 isolates, Gram positive bacteria were accounting 157 cases (84.41%) of total isolates. Among Gram positive isolates, Staphylococcal epidermidis was the most frequently isolated species with 55 cases (29.57%), followed by Streptococcus viridians 28 cases (15.05%). While Streptococcus pneumoniae was the most common isolate in the study by Upadhyaya et al[16-18] Staphylococcus aureus was reported to be the most common isolate in Basak et al,[13] while Pseudomonas spp. was common isolate in study by Hagan et al[14-22] and William et al.[18-22]

Conclusion

Infective keratitis is a common cause of ocular morbidity with fungal corneal ulcer being the most frequent ulcer. Fusarium species in fungal corneal ulcer and staphylococcal epidermidis in bacterial corneal ulcer were the common isolates. A lack of knowledge about the magnitude of the problem, financial limitations and topographical constrains were implicated in delayed presentation to a health center. There is need to initiate awareness programs at district level so that timely management can be instituted at the earliest and burden of ocular morbidity can be limited.

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