Original Article

EPIDEMIOLOGICAL AND MICROBIOLOGICAL PROFILE OF PATIENT'S HAVING MICROBIAL KERATITIS

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ABSTRACT

Background: Microbial keratitis is common potentially sight threatening ocular infection that may be caused by bacteria, fungi or virus. Epidemiological and microbiological profile of corneal ulceration have been found vary with patient population, health of cornea, geographical location and climate tends to vary over times.

Methods: The present cross-sectional study was conducted 3 on patients having microbial keratitis. Detailed history taking include duration of symptoms, predisposing factors, history of trauma, traumatic agents, associated ocular conditions, other systemic disease, treatment received prior to presentation, visual acuity at the time of presentation and all clinical findings were collected. Detailed ocular examination, using standard technique, corneal scraping were also taken under aseptic conditions from each ulcer.

Results: In our study, 51 cases belonged to low socio-economic group of which 21 cases (41%) of bacterial keratitis, 15 cases (29%) of fungal keratitis , 11 cases (21%) of viral keratitis and 4 cases (8%) of Mixed (bacterial + fungal) keratitis. **A** total 15 bacterial pathogens were isolated from the 64 eyes which yielded only bacterial growth in culture. Out of which 4(16%) were staphylococcus aureus, 4(16%) pseudomonas,3(12%) were streptococcus,2(8%) were staphylococcus epidermis. A total of 17 viral keratitis 9(53%) were recurrent cases**.**

Conclusion: Trauma is most common predisposing factor responsible for microbial keratitis. Direct microscopic examination of corneal scraping is key tool for rapid diagnosing and institution of antimicrobial therapy.

Key words: Microbial keratitis, corneal scraping, ocular

INTRODUCTION

According to WHO visual impairment and blindness global estimates, 285 million (4.25%) people are affected by visual impairment and out of them 246 million (86%) people have low vision and 39 million (14%) people are blind. Out of them, corneal opacities are responsible for 4% of total blindness in world.[1] Blindness due to microbial keratitis is an emergency as a principle reason for visual inability and that is a silent epidemic happening unnoticed around the world.[2]

A recent national survey by the Government of India 2006 – 2007 estimated that corneal lesions are responsible for 0.90% of total blindness in our country. It is expected that number of corneal blindness in India will increase to 10.6 million by 2020.[3, 4] Although non-surgical trauma to

the eye is accounted for 48.6–65.4% of total corneal ulcers in the developing countries like India. [5]

Microbial keratitis is a common, potentially sight threatening ocular infection that may be caused by bacteria, fungi or viruses. However, predisposing factors such as trauma, contact lens wear, dry eye, glaucoma, epithelial defect, systemic disease and immunosuppressant may alter the defence mechanisms of the outer eye and permit bacteria to invade the cornea. [6,7] Corneal ulceration can progress rapidly, threatening the integrity of the eye and producing significant visual impairment. [8]

One of the key elements in this effort is a proper understanding of the microbiological and clinical characteristics of this disease entity which will enable the ophthalmologist to initiate appropriate antimicrobial therapy. [9] The Epidemiological and microbiological pattern of corneal ulceration have been found to vary with the patient population, health of the cornea, geographical location and climate also tends to be varying over time. The objective of our objective this study is to identify epidemiological and microbiological profile of microbial keratitis to support the treatment modality and to prevent corneal blindness.

METHODS

The study was conducted in the department of ophthalmology, New civil hospital, Surat from November 2011 to October 2013. All the patients having microbial keratitis attending ophthalmology OPD & IPD in NCHS and those who have given voluntary informed consent were included in the study. Those cases who were severely debilitated, patients non-compliant to treatment, person living with HIV positive, extremes of age from less than 1 yrs & more than 80yrs, autoimmune disease and patient not giving proper due consent were excluded.

A total 64 patients with corneal ulceration were analyzed. Detailed history taking include duration of symptoms, predisposing factors, history of trauma, traumatic agents, associated ocular conditions, other systemic disease, treatment received prior to presentation, visual acuity at the time of presentation and all clinical findings were collected.

All the patients undergone thorough slit lamp bio-microscopic examination by an ophthalmologist. After a detailed ocular examination, using standard technique, corneal scraping were taken under aseptic conditions from each ulcer by an ophthalmologist using a sterile bard-parker blade (No-15).[7,8,9] The procedure was performed under the magnification of a slit lamp or operating microscope after instillation of 4% lignocaine without preservative.

The material scraped from the leading age and the base of each ulcer was initially directly inoculated into the surface of solid media such as blood agar, chocolate agar and sabouraud agar in a raw of C-shaped streaks. The material obtained by scraping was also spread onto labeled slides in a thin, even manner to prepare a 10% potassium hydroxide wet mount and to prepare smear for gram staining. Corneal infiltrate and ulcers were scraped for microbial culture. All laboratory method followed standard protocol.

RESULTS

Among the 64 cases, 36 (54%) were between the age group of 21 to 50 years. The patient in less than 30 years were significantly ($p<0.0001$) more than patients of extremes of age (> 30 years). Majority of patient were male and Male: female ratio was 1.5:1

There were 60% rural and 40% urban residents and the difference was statically significant ($p<0.0001$). We found maximum incidence of fungal keratitis from July to October. The occupations of patients were classified as outdoor (agriculture and manual labour), and indoor (desk job and household). Agricultural workers (21 patients) were significantly ($p<0.001$) more in number than non agricultural workers. Out of 21 Agricultural workers, 10 were suffering from fungal keratitis ($p<0.001$) as compared to other occupations.

Table 1 shows that In our study, 51 cases belonged to low socio-economic group of which 21 cases (41%) of bacterial keratitis, 15 cases (29%) of fungal keratitis , 11 cases (21%) of viral keratitis and 4 cases (8%) of Mixed (bacterial + fungal) keratitis cases because they were taking faulty treatment, false beliefs, tolerance to pain is more, only earning member in the family so ignoring complains and unhygienic environment of the patient surrounding helps indirectly in progressing of corneal ulcer. The potential predisposing factors identified in patients are shown in table-2.

Table 1: Epidemiological profile of Microbial Keratitis

	Bacteria(25)		Fungal (18)		Viral (17)		Bacteial & Fungal (4)		Total
	N	%	N	%	N	%	N	%	
Age									
<30years	7	28.0	4	22.2	11	64.7	1	25.0	23
>30 years	18	72.0	14	77.8	6	35.3	3	75.0	41
Sex									
Male	15	60.0	10	55.6	10	58.8	4	100.0	39
Female	10	40.0	8	44.4	7	41.2	0	0.0	25
Occupation									
Indoor	13	52.0	14	77.8	5	29.4	4	100.0	36
Outdoor	12	48.0	4	22.2	12	70.6	0	0.0	28
Socioeconomic Status									
Upper class	1	4.0	6	33.3	0	0.0	0	0.0	7
Middle class	3	12.0	3	16.7	6	35.3	4	100.0	16
Lower class	21	84.0	15	83.3	11	64.7	4	100.0	41
Month Wise presentation									
Jan-June	15	60.0	6	33.3	8	47.1	2	50.0	31
July-Dec.	10	40.0	12	66.7	6	35.3	2	50.0	30
Area of Residence									
Rural	15	60.0	11	61.1	5	29.4	3	75.0	34
Urban	10	40.0	7	38.9	12	70.6	1	25.0	30

Table 2: Predisposing factor associated with corneal ulcer

Predisposing factor	Bacterial (25)		Fungal (18)		Viral (17)		Bacterial & Fungal (4)		Total (64)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Trauma	12	48%	12	67%	2	12%	4	100%	30	47 %
Post-conjunctivitis	2	8%	0	0%	3	18%	0	0%	5	8 %
Lagophthalmos	2	8%	1	6%	0	0%	0	0%	3	5 %
Contact lens	2	8%	0	0%	0	0%	0	0%	2	3 %
Dry eye	2	8%	1	0%	1	6%	0	0%	4	6 %
Steroid use	1	4%	2	11%	1	6%	0	0%	4	6 %
Not known	2	8%	1	6%	10	58%	0	0%	13	20%
Total	25		18		17		4		64	

Table 3: Type of traumatic agents associated with corneal ulcers

Nature of injury	Bacterial (25)		Fungal (18)		Viral (17)		Bacteria & Fungal (4)		Total (64)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Vegetative material	0	0%	5	28%	0	0%	1	25%	6	9%
Wooden stick	0	0%	4	22%	0	0%	1	25%	5	7%
Objects –dust, stone, metal piece, Insect, Ash powder and cow tail	11	44%	3	17%	1	6%	2	50%	17	27%
Finger nail, hand	1	4%	0	0%	1	6%	0	0%	2	3%
Total	12		12		2		4		30	
Finger nail, hand	1	4%	0	0%	1	6%	0	0%	2	3%
Total	12		12		2		4		30	

Out of total 64 cases 30(47%) had history of trauma, among them 12(67%) were fungal and 12(48%) had bacterial keratitis, which was significant (p value<0.05).

5 cases had trauma with vegetative material (p=0.005) and 4 cases (33%) had trauma with wooden stick and 3 cases (25%) had history of fall of foreign body in total 18 cases of fungal keratitis. 12 cases of bacterial keratitis had history of trauma of which 11 cases(91%) were due to fall of foreign body. This might be due to agricultural worker daily exposed to vegetative material injury in the field.

A total 15 bacterial pathogens were isolated from the 64 eyes which yielded only bacterial growth in culture. Out of which 4(16%) were staphylococcus aureus, 4(16%) pseudomonas, 3(12%) were streptococcus,2(8%) were staphylococcus epidermis. A total of 17 viral keratitis 9(53%) were recurrent cases**.**

Sixty two percent of cases fungal keratitis had Hypopyon present. Among the 84% of fungal keratitis patients and out of them thick and cheesy Hypopyon was seen in 17 cases of which 11 cases(64%) of fungal keratitis and 3cases(18%) of bacterial keratitis while fluid type hypopyon was seen in total 18 cases of which 13 cases(72%) of bacterial keratitis and 4 cases(22%)of fungal keratitis.

Out of 64 patients, 16 patients (25%) were gram stain positive and 13 patients (20%) had negative. 31% was KOH stain positive. Hence smear examination an important tool in initial diagnostic work up. On culture ,most common organism isolated in gram positive bacteria was staphylococcus aureus and in gram negative bacteria pseudomonas aerugenosa.

Table 4: Types of bacterial species isolated in patients with microbial keratitis

Organism isolated	No	Percentage (25 cases)
Staphylococcus aureus	4	16%
Staphylococcus Epidermidis	2	8%
Strptococcus spp	3	12%
Pseudomonas aeruginosa	4	16%
Klebsiella	1	4%
Acinobacter	1	4%
No growth	45	-

Table 5: Hypopyon seen in cases of microbial keratitis.

Hypopyon	Bacterial		Fungal		Viral		Bacterial & Fungal		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Fluid type (yellowish)	13	52 %	4	22%	0	0%	1	25%	18	29%
Thick and cheesy	3	12%	11	62%	0	0%	3	75%	17	26%
Absent	9	36%	3	17%	17	100%	0	0%	29	45%

DISCUSSION

In the present study, Male: female ratio was 1.5:1 which matches with previous studies.[10] However Al-yousuf N et al[11] and Kotigodde et al [12] shows higher incidence among women. At birth eyes are sterile but they soon become invaded by various bacteria and microorganisms. The conjunctival sac and lid margins of the eye harbor a variety of bacteria. The interior structure is sterile, [9] the bacteria normally present can be arranged in two groups; the resident bacteria which constantly present in eye and which disturbed promptly reestablish themselves (coeynebacterium spp.). The transient bacteria which consist of non pathogenic and potentially pathogenic bacteria that inhabit the eye for short period.[9] Almost any species of bacteria can infect the cornea if the integrity of the natural anatomic barriers or defense mechanisms is compromised.[9,10] A variety of factor determine clinical outcome in microbial keratitis and the epidemiological pattern vary from one country to other and in different geographical areas in the same country. A comprehensive data is important to develop appropriate diagnostic and therapeutic strategies.

The male predominance is observed in overall cases of microbial keratitis (male:female is 1.5:1).though both sexes develop corneal ulcer more commonly in middle decade of life , a significant preponderance has been reported by most previous studies. [6,13] considering the predominant predisposing factor of trauma in all type of microbial keratitis(bacteria-48%,fungal-67%,Mixed-100%).[14,10] .most common traumatic agent were vegetative object and wooden stick . The probable reason for ocular trauma was significantly more associated with outdoor occupation like agricultural work in this series.

Maximum incidence of fungal keratitis were seen in the month of july to December I.e., 10 cases (56%), because it might be associated with rainy season and humid environment during this period. Direct microscopic examination of corneal scraping provides rapid diagnosis and forms the basis for instituting initial antimicrobial therapy which may be modified later according to culture report.[15] An accurate smear diagnosis therefore became important in achieving optimum treatment outcome.

CONCLUSION

By this study we want to conclude that microbial keratitis is more in male with low socioeconomic status working in outdoor occupation. Trauma is most common predisposing factor responsible for microbial keratitis. Maximum incidence of microbial keratitis in months of June to December and direct microscopic examination of corneal scraping is key tool for rapid diagnosing and institution of antimicrobial therapy. microbial keratitis is most common cause of corneal blindness and the knowledge of demographic factor, predisposing factor and microbiological pattern of microorganism responsible for microbial keratitis is very important for proper diagnosis and management of microbial keratitis.

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