Community Acquired Bacterial Ocular Pathogens And Their Antibiotic Resistance In Western India.

Raval Payal*, Patel Purav*, Bhatt Sima, Katara Rajesh***, Patel Sangeeta****, Rajat Rakesh******

* Tutor, ** Professor & Head of Dept., *** Associate Professor, **** Assistant Professor, All in Department of Microbiology, GMERS-Gandhingar, Gujarat, India.

Abstracts: Background: Various type of ocular infections are responsible for increased prevalence of morbidity and blindness worldwide. Specific therapy of ocular infections often requires etiological diagnosis and antibiotic sensitivity profile for individual. Methodology**:** This study was conducted on 120 patients attending ophthalmology institute in tertiary care eye hospital. All patients were included consecutively after the initial clinical diagnosis of ocular infection. Brief clinical history and demographic data along with samples was collected and analyzed in proper manner in accordance with standard protocols. Results: Out of total 120 samples, 55 samples were positive for bacterial culture. Most common causative organism among gram negative isolates, was Pseudomonas (19/55) and in case of the gram positive isolates, was S. aureus (16/55). Maximum sensitivity was observed towards linezolid and vancomycin for gram positive isolates and for rest of others, imipenem and combinations antibiotics. Conclusion**:** The type and pattern of organisms that cause ocular infection changes over time. Antibiotics which have broad coverage, sensitivity and are effective enough to treat the common corneal pathogens should be used. [Patel P NJIRM 2015; 6(2):90-93]

Key Words: Ocular, bacterial infection, antibiotic resistance.

Author for correspondence: Purav Patel, Tutor, Department of Microbiology, GMERS, Gandhinagar, Gujarat, India.
E- mail: drpurav84@rediffmail.com

Introduction: The eye is well protected from infection by the conjunctiva and the corneal epithelium. However, predisposing factors may alter the defense mechanisms of the eye and permit bacteria to invade the eye.[1,2] Various type of ocular infections are responsible for increased prevalence of morbidity and blindness worldwide. Specific therapy of ocular infections often requires etiological diagnosis and antibiotic sensitivity profile that is a combined effect of observation of characteristic clinical features and microbiological investigations.[3]

The purpose of this study was to determine Bacterial etiology, predisposing factors and antibiotic resistance pattern of isolates of ocular infection in patients attending ophthalmic institute in a tertiary care eye hospital in western India.

Material and Methods: In this study data was collected on 120 patients between May 2011 to May 2012. All patients were included consecutively after the initial clinical diagnosis of ocular infection was made. Patients hospitalised more than 48 hrs were not included in this study to exclude chance of hospital acquired infection. Brief clinical history and demographic data was collected and analysed in proper manner. All the samples were processed according to standard protocols.[4,5] The specific identification and antibiotic sensitivity of bacterial pathogens was based on standard laboratory criteria.

Results: Out of total 120 samples, 55 samples were positive for bacterial culture. Out of 55 positive sample majority of patients (32) were in age group of 21-40 years followed by (19) in age group of 41-60 age years. Male: female ratio was 1.6:1. Most of the samples collected were conjunctival and corneal scrapping (41) followed by purulent discharge (9). Samples from Anterior chamber aspirate and Intravitreous tapping were also collected in this study. With correlation of predisposing factors, among all 55 positive isolates, 25 patients had history of ocular trauma in form of vegetative injury, Injury by unknown foreign body, dust injury or any other unspecified. While 12 patients and pre-existing ocular condition like conjunctivitis, dacryocystitis or blepharitis. 2 patients had history of contact lens wearing.

Out of 55 bacterial isolates, 30 were gram positive and remaining 25 were gram negative isolates. Most common causative organism among the bacterial isolates responsible for ocular infection was Pseudomonas spp., which was isolated from 19 clinical samples. After that another causative organisms among gram negative isolates were

Acinetobacter spp. (3), Proteus mirabilis (2) and E. coli (1). Among the gram positive isolates, S. aureus was the most common which was isolated from 16 samples followed by Coagulase negative staphylococci (8), Streptococcus spp. (5) and S. citrus (1). Mixture of organisms was not seen in any of the samples.

Table – 1: Details of Culture positive isolates

Bacterial isolates		**55**	**100%**
Gram positive isolates	S. aureus	16	29.09%
	SCN	8	14.55%
	Streptococcus spp.	5	9.09%
	S. citrus	1	1.82%
Gram negative isolates	Pseudomonas spp.	19	34.55%
	Acinetobacter spp.	3	5.45%
	Proteus Mirabilis	2	3.64%
	E. coli	1	1.82%

Table – 2: Antibiotic sensitivity profile of bacterial isolates

Antibiotic	**Gram Positive**	**Antibiotic**	**Gram Negative**	**Antibiotic**	**Pseudo-monas**
	% Sensitivity		**% Sensitivity**		**% Sensitivity**
Ciprofloxacin	76.67	Ciprofloxacin	50.00	Ciprofloxacin	63.16
Levofloxacin	93.33	Levofloxacin	100.00	Levofloxacin	78.95
Linezolid	100.00	Ampicillin-Sulbactam	100.00	Ceftazidime	63.16
Azithromycin	76.67	Pip-Tazobactam	100.00	Cefotaxime	52.63
Co-trimoxazole	76.67	Co-trimoxazole	66.67	Piperacillin	73.68
Tetracycline	80.00	Tetracycline	50.00	Pip-Tazobactam	89.47
Gentamycin	76.67	Gentamycin	50.00	Gentamycin	36.84
Clindamycin	83.33	Cefotaxime	50.00	Cefoperazone	47.37
Cefoxitin	90.00	Cefepime	83.33	Aztreonam	84.21
Chloramphenicol	90.00	Chloramphenicol	50.00	Cefepime-Tazobactam	84.21
Ampicillin	70.00	Amikacin	66.67	Amikacin	78.95
Vancomycin	100.00	Imipenem	100.00	Imipenem	100.00

In this study S. aureus were predominantly resistant to ampicillin and azithromycin while it showed good sensitivity to higher generation quinolones, cefoxitin (oxacillin) and chloramphenicol. All isolates were sensitive to linezolid and vancomycin. Out of total staphylococcus isolates, 2 from S. aureus and one from CONS were MRSA. Majority of the CONS and streptococcus spp. were sensitive to all antibiotics.

Pseudomonas, which was the predominant gram negative bacilli isolated in this study, was found to be predominantly resistant to 1st and 2nd generation cephalosporins, ciprofloxacin and gentamicin. They showed excellent sensitivity to Imipenem, Pip-Tazobactam, Cefepime-Tazobactam and Aztreonam. All pseudomonas isolates also showed good sensitivity to levofloxacin, amikacin and piperacillin. Other gram negative isolates were

resistant to 1st and 2nd generation cephalosporins but were sensitive to 3rd and 4th generation cephalosporins, B lactam + B lactamase inhibitor and higher generation fluoroquinolones.

Discussion: Ocular infection occurred most frequently in the age group of 21 – 40 years followed by 41-60 years. According to gender wise distribution, infection rate was higher in male patients (34/55) possibly because of more outdoor activities as compared to female. Mean age of the patients in this study was 38.64 years. Similar observations were noted by in a study of Dhakhwa K [6] & also in other studies [7, 8, 9, 10]. H/O Ocular trauma was one of the most common predisposing factor in this study which is in correlation with other previous study.[10,11] Out of total samples collected, Most of the samples were taken from conjunctiva and cornea. This can be explained by the fact that these structures are most exposed to the outer environment and trauma thus liable to infections. In this study, bacterial infections accounted for 45.83% of total samples evaluated. Bacterial infection has been reported to account for 34.98% in South India [12], 54% in Bangladesh [10], 32.77% in south India [11]. Most common bacteria isolated were Pseudomonas and S. aureus. Similar results have been obtained in the previous studies worldwide [10, 11, 13, 14, 15, 16]. Microbiological profile and pattern of antibiotic susceptibility in ocular infection may be various in different geographical areas as well as it depend on host and various predisposing factors. So practice should be made to identify the ocular pathogen and performing susceptibility testing. Although resistance and sensitivity based on in-vitro testing may not reflect the true clinical resistance and response to an antibiotic because of the host factors and penetration of the drug, these results can guide a clinician to make an decision when choosing an initial regimen for treatment of ocular pathogens [17]. Among gram positive isolates maximum sensitivity was observed towards linezolid and vancomycin followed by higher generation quinolones. In case of gram negative isolates, they were all sensitive to imipenem, beta lactam-beta lactamase inhibitor combination and higher generation quinolones. For pseudomonas, maximum sensitivity was observed towards imipenem followed by Piperacillin-Tazobactam and Cefepime- Tazobactam.

Conclusion: Microscopic evaluation of ocular sample can provide insight into the identity of the pathogens. The type and pattern of organisms that cause ocular infection changes over time. Antibiotics which have broad coverage, sensitivity and are effective enough to treat the common corneal pathogens should be used. So, we conclude that all the patients of ocular infection should be subjected to microbiological evaluation and put on broad spectrum antimicrobials till culture results are available. Persistent efforts should be put for continuous surveillance and epidemiological characterization which are imperative to treat and prevent morbidity and blindness of population at risk in India.

References:

1. Reddy M, Sharma S, Rao GN. Corneal Ulcer. In: Modern Ophthalmology. 2 nd ed. Dutta LC. Eds (Jaypee Brothers Medical Publishers, New Delhi) 2000; 1. pp 200-216.
2. Abbott RL, Kremer PA, Abrams MA. Bacterial Corneal Ulcers. Chapter 18 In: Duane's Clinical Ophthalmology. Tasman N, Jaeger EA, Eds. (J.B Lippincott Company, Philadelphia) 1994;4:1-36.
3. Sharma S. Diagnosis of infectious diseases of the eye. [Abstract] Eye (London, England), 2012, vol. 26, issue 2, p 177, ISSN 14765454. ISBN 14765454.
4. Performance Standards for Antimicrobial Susceptibility Testing. Clinical and Laboratory Standards Institute 2011
5. K. Lily Therese, H.N. Madhavan. Microbiological procedures for diagnosis of ocular infections. Available from: www.ijmm.org/documents/ocular.pdf
6. Dhakhwa K, Sharma MK, Bajimaya S. Causative organisms in microbial keratitis. Nepal J Ophthalmol 2012; 4(7):119-127
7. Bashir G, Shah A, Thokar MA, Rashid S, Shakeel S. Bacterial and fungal profile of corneal ulcers—a prospective study. Indian J Pathol Microbiol. 2005 Apr;48(2):273-7
8. Schønheyder HC, Pedersen JK, Naeser K. Experience with a broth culture technique for diagnosis of bacterial keratitis. Acta Ophthalmol Scand. 1997 Oct;75(5):592-4.

9. Dart JK. Predisposing factors in microbial keratitis, the significance of contact lens wear. Br J Ophthalmol. 1988 Dec;72(12):926-30.
10. AAS Dunlop, ED Wright. Suppurative corneal ulceration in Bangladesh A study of 142 cases examining the microbiological diagnosis, clinical and epidemiological features of bacterial and fungal keratitis. Australian and New Zealand Journal of Ophthalmology 1994; 22(2)
11. MJ Bharathi, R Ramakrishnan, S Vasu, R Meenakshi, C Shivkumar, R Palaniappan. Epidemiology of bacterial keratitis in a referral centre in south india. Indian Journal of Medical Microbiology, (2003) 21 (4):239-245
12. Bharathi MJ, Ramakrishnan R, Vasu S, Meenakshi R, Palaniappan R. Aetiological diagnosis of microbial keratitis in south India. Indian J Med Microbiol 2002;20:19-24.
13. B L Sherwal, AK Verma. Epidemiology of Ocular Infection Due to Bacteria and Fungus – A Prospective Study. JK SCIENCE- July-September 2008 Vol. 10 No.3.
14. Liesegang TJ, Forster RK. Spectrum of microbial keratitis in south Florida. Am J Ophthalmol 1980;90:38-47.
15. Schaefer F, Bruttin O, Zografos L, Guex-Crosier Y. Bacterial keratitis: a prospective clinical and microbiological study. Br J Ophthalmol 2001;85:842-847.
16. Sharma S, Kunimoto DY, Garg P, Rao GN. Trends in antibiotic resistance of corneal pathogens. Part I. An analysis of commonly used ocular antibiotics. Indian J Ophthalmol 1999;47:95- 100
17. Savitri S, Derek K, Prashant G, Gullapalli R. Trends in antibiotic resistance of corneal pathogens: Part I. An analysis of commonly used ocular antibiotics. Indian J Ophthalmol 1999; 47:95-100.

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