Original Research Article

Clinical and microbiological study of bacterial keratitis among patients attending tertiary care hospital

Anup Suresh Yewale[1], Darshan Pankaj Shaha[2*]

[1]Associate Professor, [2]Assistant Professor, Department of Opthalmology, Dr. Ulhas Patil Medical College and Hospital, Jalgaon, Maharashtra, INDIA.
Email: anupsyewale@yahoo.com

Abstract

Background: Infectious or microbial keratitis can be caused by a wide spectrum of organisms, including a huge variety of bacteria, fungi, viruses and parasites. Bacterial keratitis is a potentially devastating corneal infection due to the possibility of rapid progression; corneal destruction may be complete in 24–48 hours with some of the more virulent bacterial aetiological agents. **Aim and Objectives:** To study clinical profile and microbiological spectrum of bacterial keratitis among patients attending tertiary care hospital. **Material and Methods:** In this cross-sectional study, a total of 80 clinically diagnosed cases of keratitis, who attended the Ophthalmology Out-Patients Department of tertiary care hospital were studied over a period of 12 months from January 2016 to December 2016. **Results:** Incidence of corneal ulcer was more common in 3rd and 4th decade that is middle age group. Out of 80 cases, 39 were culture positive i.e. 48.75% and bacterial isolates accounted for 21 out of 39 culture positive results of the organisms isolated. **Summary and conclusions:** Corneal ulcer is one of the predominant causes of blindness and ocular morbidity in developing countries. Trauma is the leading cause for the corneal ulcers. Staphylococcusspp. Were them ostcommonbacterialpathogens isolated from patients with keratitis in this setting.

Key Words: Bacterial keratitis.

***Address for Correspondence:**
Dr. Darshan Pankaj Shaha, Assistant Professor, Department of Opthalmology, Dr. Ulhas Patil Medical College and Hospital, Jalgaon, Maharashtra, INDIA.
Email: anupsyewale@yahoo.com

Received Date: 24/07/2017 Revised Date: 17/08/2017 Accepted Date: 14/09/2017
DOI: https://doi.org/10.26611/1009337

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 16 September 2017

INTRODUCTION

Cornea is one of the most important and sensitive parts of the human eye as it contributes the majority of its refractive power and also provides a clear entrance to the light rays in the eye.[1] Cornea is privileged because of its transparency which depends mainly upon its avascularity,[2] dehydrated state, smooth surface epithelium and well organized stromal collagen fibers.[3] Although cornea does not depend on oxygen provided by lungs through blood and takes oxygen from air directly,[4] but this a vascularity makes it vulnerable to a variety of infections because it is deprived of the usual defense mechanisms of the body in the form of circulating polymorphs, lymphocytes and antibodies. Although there is some protection for the cornea in the form of lysozyme, lactoferrin, IgA, lipocalin[5]etc, but it is meager and the cornea acts like a tied prisoner in the face of pathogens when it is breached. Infectious keratitis is the most common cause of uniocular blindness in the world[6]. Infectious or microbial keratitis can be caused by a wide spectrum of organisms, including a huge variety of bacteria, fungi, viruses and parasites. Depending on the characteristics of population and of geographical areas, there is variation in distribution of causative organisms.[7]Bacterial keratitis is a potentially devastating corneal infection due to the possibility of rapid progression; corneal destruction may be complete in 24-48 hours with some of the more virulent bacterial aetiological agents. Species of high virulence, such as Staphylococcus aureus, Streptococcus pneumoniae,

How to cite this article: Anup Suresh Yewale, Darshan Pankaj Shaha. Clinical and microbiological study of bacterial keratitis among patients attending tertiary care hospital. *MedPulse International Journal of Ophthalmology*. September 2017; 3(3): 71-74. https://www.medpulse.in/Ophthlmology/

Pseudomonas aeruginosa, and even Neisseria meningitidis, have been reported. Coagulase-negative staphylococci (CoNS) are also being increasingly reported as the cause of bacterial keratitis in various parts of the world.[8]Thevisual prognosis after bacterial keratitis depends on the size, locality, and depth of the ulcer, as well as on the risk factors and the bacteria isolated.[9]

MATERIAL AND METHODS

In this cross-sectional study, a total of 80 clinically diagnosed cases of keratitis, who attended the Ophthalmology Out-Patients Department of tertiary care hospital were studied over a period of 12 months from January 2016 to December 2016. The present study was conducted after obtaining informed patient consent and approval by Institutional Ethical Committee. Inclusion Criteria used was clinically diagnosed cases of bacterial keratitis irrespective of age and prior treatment were included in the study. Exclusion Criteria included all thosepatients with suspected or confirmed viral or protozoalor fungal keratitis were excluded. A detailed history of the disease with special reference to ocular injury, other predisposing local or systemic factors and history of medication prior to ophthalmic consultation were recorded. The specimens were collected by an ophthalmologist. The eye was anaesthetized with lignocaine drops. The surrounding skin was wiped with sterile gauze soaked in sterile saline. The ulcers were scraped thoroughly but gently with sterile No.23 gauge needle. Corneal scrapings were streaked directly on to a blood agar medium by the C streak method. Bacterial growth was identified by standard laboratory procedures and the antibiotic sensitivity testing was performed by the disk diffusion method as per CLSI guidelines. Statistical analysis done by using appropriate statistical methods.

RESULTS AND OBSERVATIONS

Table 1: Age distribution, sex distribution and socioeconomic distribution

Age wise distribution of patients		
Age in years	**Frequency**	**Percentage**
1-20	10	12.50
21-40	44	55.00
41-60	19	23.75
Above 60 years	7	08.75
Gender wise distribution of patients		
Gender	Frequency	Percentage
Male	49	61.25
Female	31	38.75
Socio-Economic Status distribution of patients		
Low	40	50.00
Middle	28	35.00
High	12	15.00

Table 2: Details of corneal ulcer in present study

Variables	Frequency	percentage
Living conditions		
Rural	48	60.00
Urban	32	40.00
Duration of treatment before seeking treatment		
<10 days	60	75.00
<20 days	13	16.00
>/= 20 days	07	09.00
Local Predisposing factors		
Ocular trauma (including foreign bodies)	37	46.25
Dacryocystitis	06	07.50
Eye lids or lashes abnormalities	03	03.75
Decreased corneal sensation	04	05.00
Contact lens wear	03	03.75
Symptoms of corneal ulcer		
Pain	62	77.50
Redness	80	100.00
Watering	80	100.00
Dimunition of vision	66	82.50
Photophobia	31	38.75
Foreign body sensation	80	100.00

Table 3: Location of corneal ulcer, size of infiltrate and hypopyon in corneal ulcer

Location of corneal ulcer		
Location	**Frequency**	**Percentage**
Central	37	46.25
Peripheral	23	28.75
Both sides	20	25.00
Size of Infiltrate		
<6mm in diamter	42	52.50
>6mm in diameter	38	47.50
Hypopyon in corneal ulcer		
Absent	57	71.25
Present	23	28.75

Table 4: Culture results in study

Culture Findings		
Culture positives	39	48.75
Culture negatives	41	51.25
Culture results		
Fungal	18	22.50
Bacterial	21	26.25
Sterile (negative)	41	51.25
Bacterial Results		
Gram Positive Bacteria		
Bacteria	n=21	percentage
Staphylococcus aureus	07	33.34
CoagulaseNegative staphylococcus	06	28.57
Streptococcus pneumonia	03	14.28
Other streptococcus	02	09.57
Gram Negative Bacteria		
Pseudomonas	03	14.28

Incidence of corneal ulcer was more common in 3rd and 4th decade that is middle age group. In this study, corneal ulcer is more common in males. 60% of the cases belong

to low socio economic status, as malnutrition, poor sanitation is more common in this group. Incidence was more among rural population as they are more involved in works prone to corneal ulcer like agriculture, construction, mining etc. Out of 80 cases, 60 cases sought treatment between 1-10 days. In this study out of 80 cases 52.50% cases had stromal infiltrate of <6mm diameter. Out of 80 cases, hypopy on was found only in 23 cases. Out of 80 cases, 39 were culture positive i.e., 48.75% and 0ut of 39 culture positive, 18 were fungal isolates and 21 were bacterial isolates. Bacterial isolates accounted for 21 out of 39 culture positive results of the organisms isolated. The most common bacterial pathogensisolated were various species of Staphylococcus like staphylococcus aureus (07/21; 33.34%), coagulase negative staphylococci (06/21; 28.57%) etc. while streptococcus pneumonia accounts to 03/21 i.e. 14.28%. The gram negative bacterias like pseudomonas being the most common accounting to be 03 /21 i.e. 14.28% of total bacterial isolates.

DISCUSSION

The incidence of microbial keratitis was higher in males (61.25%) than in females (38.75%) with Male to Female Ratio 1.58:1. This ratio is near to that reported by Srinivasan M. *et al*[10], (1.6:1). Males form the majority of working class, hence exposure to risk factors is more. Both sexes tend to develop corneal ulcer in the 3rd to 5th decades of life when presumably they are more physically active and are at higher risk of corneal injury. According to APEDS study[11] common cause of corneal blindness is keratitis in childhood followed by trauma. And the most common cause of trauma in urban area is flying/ thrown objects, and the rural area is due to vegetative matter. In 37 patients only central, and in 20 patients both central and peripheral cornea was involved. In majority cases the area of infiltrate was < 6 mm in diameter and the depth of infiltrate was < 2/3 of stroma. The ulcers which were in peripheral location, smaller area of infilterate and less depth had good visual outcome after healing. A large lesion >6mm was significant predictor for poor visual outcome. Bacterial Isolates in the present study was observed in 21 cases (26.25%). In studies by Leck A.K.*et al*[12] in south India (23.9%), Srinivasan. M. *et al*[10] in Madurai south India (47.1%). Among the 43 culture-positive patients in study by Mehta S *et al.*[13], 29 (67.44%) patients were positive for fungi, while 14 (32.56%) patients gave a positive yield for bacteria. A study by Reenaanie Jose *et al.*[14]showsthat, Among the culture positive cases, bacterial isolates constituted 52.08% and the rest were fungal (47.92%).

CONCLUSION

Corneal ulcer is one of the predominant causes of blindness and ocular morbidity in developing countries. Understanding the geographical pattern of the pathogenic organisms responsible and the identification of risk factors, helps to create a broad strategy for the diagnosis and management of corneal ulcers. Trauma is the leading cause for the corneal ulcers. Staphylococcusspp. Were them ostcommon bacterial pathogens isolated from patients with keratitisin this setting.

REFERENCES

1. Willoughby CE, Ponzin D, Ferrari S, Lobo A, Landau K, Omidi Y. Anatomy and physiology of the human eye: effects of mucopolysaccharidoses disease on structure and function–a review. ClinExpOphthalmol. 2010; 38: 2-11.
2. Azar DT. Corneal angiogenic privilege: angiogenic and antiangiogenic factors in corneal avascularity, vasculogenesis, and wound healing (an american ophthalmological society thesis). Trans Am Ophthalmol Soc. 2006; 104: 264-302.
3. Qazi Y, Wong G, Monson B, Stringham J, Ambati BK. Corneal transparency: genesis, maintenance and dysfunction. Brain Res Bull. 2010; 81: 198-210.
4. Leung BK, Bonanno JA, Radke CJ. Oxygen-deficient metabolism and corneal edema. ProgRetin Eye Res. 2011; 30: 471-92.
5. McDermott AM. Antimicrobial Compounds in Tears. Exp Eye Res. 2013; 117: 53-61.
6. Tananuvat N, Suwanniponth M. Microbial Keratitis in Thailand: a survey of common practice patterns. J Med Assoc Thai. 2008; 91: 316-22.
7. Sethi S, Sethi MJ, Iqbal R. Causes of microbial keratitis in patients attending an eye clinic at Peshawar. Gomal J Med Sci. 2010; 8: 20-2.
8. P.Manikandan,M.Bhaskar,R.Revathy,R.K.John,K.Narendran,andV.Narendran,"SpeciationofcoagulasenegativeStaphylococcus causing bacterial keratitis," Indian Journal of Ophthalmology,vol.53,no.1,pp.59–60,2005.
9. M.J.Bharathi, R.Ramakrishnan, S.Vasu, R.Meenakshi, and R.Palaniappan, "In-vitro efficacy of antibacterialsagainstbacterial isolatesfromcornealulcers,"IndianJournalofOphthalmology, vol.50, no.2, pp.109–114, 2002.
10. Srinivasan M, Gonzales C A, George C et al. Epidemiology and Aetiological Diagnosis of Corneal Ulceration in Madurai, South India. British Journal of Ophthalmology 1997:81:965-971.
11. R Dandona, L Dandona: Review of findings of the Andhra Pradesh Eye Disease Study: policy implications for eyecare services. IJO 2001; 49:215-340.
12. LeckA K et al; Aetiology of Suppurative Corneal Ulcers in Ghana and South India, and Epidemiology of Fungal Keratitis; British Journal of Ophthalmology. 2002; 86:1211-5. 17
13. Mehta S, Mehta M; Clinical and Microbiological Profile and Treatment Outcome of Infective Corneal Ulcers: A Study in Central India; International Journal of Scientific Study; March 2017; Vol 4(12); pp-234-40.

14. Reenaanie Jose, Vijayakumar S, Rajini KC, Prithinair K, Reena John; Epidemiological and Microbiological Profile of Infective Keratitis at a Tertiary Care Centre in Central Zone of Kerala, India; National Journal of Laboratory Medicine. 2017 Jan, Vol-6(1):pp06-11

Source of Support: None Declared
Conflict of Interest: None Declared