Microbiological Profile of Infectious Keratitis Reported in a Tertiary Care Hospital of Central India

Rashmi Mahalle, Ujjawala Dehankar
Department of Microbiology, NKPSIMS & Lata Mangeshkar Hospital, Digdoh Hill, Hingana, Nagpur (Maharashtra)

Original Research Article

ABSTRACT

The study identified bacterial and fungal agents causing infectious keratitis among cases admitted with corneal ulcer and conducted antibiotic susceptibility testing of bacterial isolates. Corneal scrapping from all patients with corneal ulcer received at tertiary health care facility were examined using 10% KOH, Gram's staining methods and culture. Bacterial and fungal isolate identification was done by conventional method. Antibiotic sensitivity was performed for bacterial isolates. Staphylococcus sp. was most common isolate followed by Pseudomonas aeruginosa and Streptococcus sp. Aspergillus niger was most common isolate among fungi.

KEY WORDS: bacterial, fungal, keratitis, tertiary

INTRODUCTION:

Corneal blindness is major public health problem worldwide and infectious keratitis is one of the predominant causes[1]. Developing countries have higher burden of keratitis than developed countries. The etiological agents implicated are viruses, bacteria, fungi and protozoa. In developed world viral infections are leading cause for corneal ulcer, where as in developing countries bacteria, fungi and Acanthamoeba are more common. It is therefore important to know the etiological agent of keratitis[2]. Corneal epithelial defect makes it vulnerable to invasion by organisms[3]. The spectrum of bacterial corneal pathogens depends on the local microbial flora and climatic conditions[4]. Therefore this study was conducted to identify the common organisms causing keratitis in our region.

MATERIALS AND METHODS:

This study was conducted in the Department of Microbiology in a tertiary care hospital associated with NKP Salve Institute of Medical Sciences and Research Centre, Nagpur, Maharashtra, India during June 2015 to June 2018. Corneal scrapping from all patients with corneal ulcer were examined using 10% KOH and Gram staining methods. It was inoculated on blood agar, chocolate agar and Sabouraud dextrose agar. Bacterial isolates were identified based on Gram stain, colony morphology and biochemical tests. Antibiotic sensitivity of bacterial isolates was carried out by Kirby Bauer disc diffusion method. Fungal isolates were identified by the rate of growth, colony morphology on Sabouraud dextrose agar and slide culture[1].

Corresponding Author:
Dr Rashmi Mahalle
Lecturer Department of Microbiology,
NIPSIMS & Lata Mangeshkar Hospital,
Digdoh Hill, Hingana,
Nagpur - 440019 (Maharashtra)
Phone No.: 8108750960
E-mail: rashmidhote@yahoo.co.in

RESULTS:

The present study was conducted in a tertiary care hospital in Nagpur for a period of 3 years. One hundred and fifty three scrapings from corneal ulcer were sent to the Microbiology department from June 2015 to June 2018. Male patients 103 (67%) were more than female 50 (32.67%). Culture positivity for bacterial and fungal culture was seen in 37 samples i.e. 24% (Table 1).

The mean number of corneal scraping per year from 2015 till 2018 was 52. There were no mixed growth. All the 37 isolates were sole growth from corneal ulcers. Gram stain smear detected organisms in 7 scrapping out of 23 bacterial culture positive. 16 were Gram stain smear negative but culture positive. Fungal hyphae was seen in 7 primary smear / KOH mount out of 14 culture positive fungal isolates.

Among bacterial cultures 18 (78%) were gram positive and 5 (22%) were gram negative isolates (Table 2). The most common bacterial isolate

Table 1: Distribution of Isolates (n=37).

S No	Isolate	Number	Percentage
1	Bacteria	23	62.16%
2	Fungi	14	37.84%

Table 2: Distribution of Bacterial Isolates.

S No	Bacterial Isolates	Number	% of Total Isolates
1	MRSA	04	10.81
2	MSSA	04	10.81
3	CoNS	02	05.41
4	Streptococcus pyogenes	04	10.81
5	Streptococcus pneumonia	03	08.11
6	Pseudomonas aeruginosa	05	13.51
7	Bacillus sp.	01	02.70
	Total	23	62.16

were Staphylococcus species accounting for 10 isolate i.e. 50% of total bacterial culture, followed by Streptococcus sp. at 7 i.e. 30.4%, then Pseudomonas sp. at 5 i.e. 21.7%. Most frequently isolated bacteria was Staphylococcus sp. (10), followed by Psuedomonas aerugenosa (5), Streptococcus pyogenes (4), Streptococcus pneumoniae (3) (Table 2). All bacterial isolates were tested for antimicrobial susceptibility testing, using Kirby Bauer disc diffusion technique. All the pseudomonas isolates are susceptible to Imipenem and, Piperacillin & Tazobactum. They show good susceptibility to ciprofloxacin, Amikacin and Tobramycin (Figure 1). Most frequently isolated fungi was Aspergillus sp. Followed by Fusarium sp, Curvularia sp and Mucor sp. 1 isolate was of Acremonium sp (Table 4).

DISCUSSION:

Infectitious keratitis leads to potentially devastating ocular morbidity as corneal epithelium is breached due to trauma, resulting in ulcer for mation[4,5]. It is leading cause of blindness in developing countries[5]. In the present study, male patients were more in number than female which is similar to study conducted by Chittur et al[5]. However Suwal et al reported female predominance in their study[7]. Abubakar et al also shows that females i.e. house wives are more commonly affected[6].

Infectitious keratitis affects people in their productive age group. Trauma is the major predisposing factor causing corneal ulcers. In our study also injury to eye is seen in 32% of patients. It is consistent finding in other studies as well. [5,6,8] Corneal trauma damages the corneal epithelium which make the underlying tissue susceptible to bacterial adhesion, penetration and replication. Plants, metals, plastic parts, fireworks and pencils cause accidental ocular trauma[9].

Culture positivity for both bacterial and fungal isolates combined was 24%, which was lower than other studies from Nigeria (46.8%), Nepal (44.6%), south India (37.5%), Toronto (57.4%) and Mexico city (34%). [4,5,6,7,8] The low culture positivity may be due to use of antibiotic drops prescribed by general practitioners or self medication by patients. In addition, the viral keratitis doesn't show any growth. Improper collection of sample and delay in transport and processing can also affect results.

Gram stain smear was positive for bacteria only in 7 (30%) cases where as 50% were positive for fungal elements/hyphae. Gram positive bacteria isolated in this study was 78%, which is similar to previously reported in other studies. [9,10,12,13]

Staphylococcus aureus with 8 isolates was the most common isolate, followed by Streptococcus species in 7 isolates, followed by Staphylococcus epididimis in two isolates. This is consistent with findings of Chittur et al[5]. Four isolates were of MRSA. Pseudomonas aeruginosa was the only gram negative bacteria isolated, as seen in Saldana et al[9].

All MRSA isolates were sensitive to vancomycin and tetracycline. Only three were sensitive to ciprofloxacin. All isolates were resistant to gentamycin and chloramphenicol. All Methicillin sensitive staphylococcus aureus (MSSA) were sensitive to ciprofloxacin, clindamycin, vancomycin and tetracycline. All isolate of Streptococcus pyogenes are sensitive to vancomycin and erythromycin. Only two isolates were sensitive to penicillin. Streptococcus pneumonia showed good sensitivity to ciprofloxacin, penicillin, erythromycin and clindamycin.

Pseudomonas aerugenosa has good sensitivity to Imipenem and Pipercillin + tazobactum, similar to Yu et al[10]. It has low sensitivity to ceftazidime, a finding similar to Suwal et al[7]. Al Yousuf et al reports Pseudomonas aeruginosa as the most common causative organism in his study and it is associated with use of contact lens [15-18].

Among the fungal isolates, most common was Aspergillus niger i.e. 5 isolates, followed by 2 isolates each of Aspergillus fumigatus, Curvularia sp,

Table 3: Sensitivity of Gram Positive Isolates.

Bacterial Isolates (No)	Ciprofloxacin	Erythromycin	Clindamycin	Tetracycline	Vancomycin	Linezolide
MSSA (04)	4	2	4	4	4	4
MRSA (04)	2	2	3	4	4	4
MRCoNS (01)	1	1	1	1	1	1
Streptococcus pyogenes (04)	3	2	3	NA	4	4
Streptococcus pneumonia (03)	3	2	2	NA	3	3

#MSSA: Methicillin Sensitive Staphylococcus Aureus; MRSA: Methicillin Resistant Staphylococcus Aureus; MRCoNS: Methicillin Resistant Coagulase Negative Staphylococcus

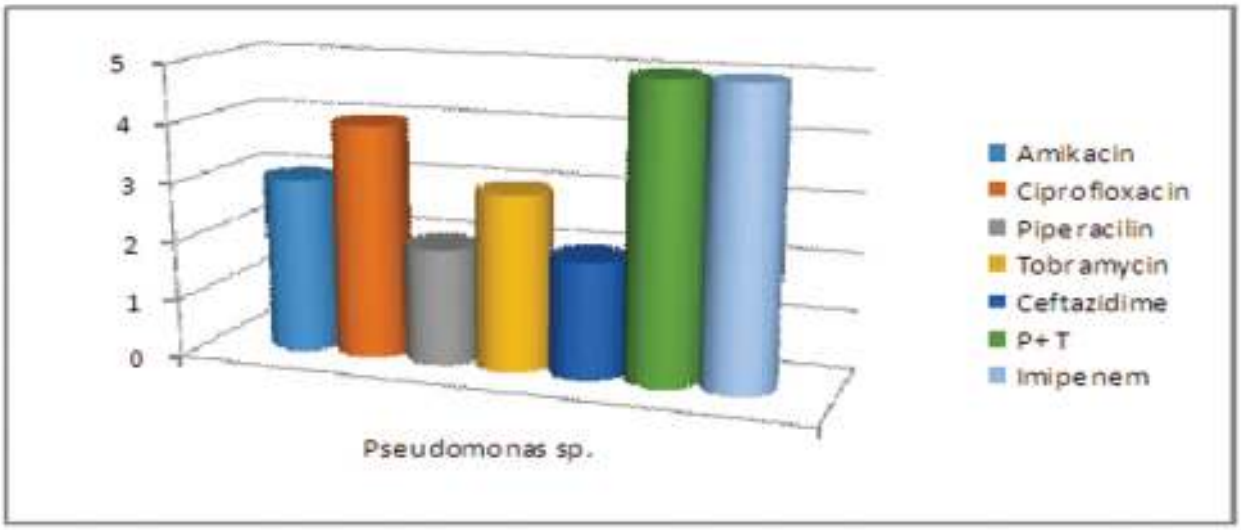

Figure 1: Sensitivity of Pseudomonas sp. # P+T - Piperacillin + Tazobactum.

Table 4: Distribution of Fungal Isolates.

S No	Isolate	Number	% of Total Isolates
1	Aspergillus niger	05	13.50
2	Aspergillus fumigatus	02	05.40
3	Fusarium sp.	02	05.40
4	Curvularia sp.	02	05.40
5	Mucor sp.	02	05.40
6	Acremonium sp.	01	02.70
	Total	14	37.84

Fusarium sp and Mucor sp. One isolate was of Acremonium sp. Our study matches with the results of other studies reporting Aspergillus sp. as most frequent cause of fungal keratitis[2,9,12,13,19].

CONCLUSION:

The study identifies common bacterial and fungal pathogens associated with infectious keratitis and the antibiotic susceptibility of bacterial isolates. Further studies are needed to know the outcome of patients with infectious keratitis. It is also essential to conduct routine surveillance of infectious keratitis for ensuring update on the existing and emerging pathogens.

REFERENCES:

1. Sengupta S, Rajan S, Reddy PR, Thiruvengadakrishnan K, Ravindran RD, Lalitha P et al. Comparative study on the incidence and outcomes of pigmented versus nonpigmented keratomycosis. Ind J Ophthal. 2011;59(4):291-296
2. Gupta A, Capoor MR, Gupta S, Kochhar S, Tomer A, Gupta V . Clinico-demographical profile of keratomycosis in Delhi,North India. Ind J Med Microbi. 2014;32(3);310-314
3. Ruescas V, Marchite CI, Tercero A, Marchite N, Picazo J. Streptococcus pneumonie keratitis, a case report.
4. Kaliamurthy J, Kalavathy CM, Parmar P, Jesudasan C, Thomas PA . Spectrum of bacterial keratitis at a tertiary eye care centre in India. Biomed Research International. 2013;http: //www.hindawi.com/journals/ bmri/2013 /181564
5. Ranjini CY, Waddepally VV. Microbial profile of corneal ulcers in a Tertiary care hospital in south India. J Ophthalmic Vis Res. 2016; 11(4): 363-367.
6. Abubakar UM, Lawan A, Muhammad I . Clinical pattern and antibiotic sensitivity of bacterial corneal ulcers in Kano, Northern Nigeria. Ann Afr Med. 2018;17(3):151- 155.
7. Suwal S, Bhandari D, Thapa P, Shrestha MK, Amatya J . Microbiological profile of corneal ulcer cases diagnosed in a tertiary care ophthalmological institute in Nepal. BMC Ophthal. 2016;16: 209.
8. Lichtinger A, Yeung SN, Kim P, Amiran MD, Iovieno A, Elbaz U et al. Shifting trends in bacterial keratitis in Toronto: An 11- year review. Ophthal. 2012;119(9):1785-1790.
9. Saldana P, Bautista de Lucio V, Camarena JC, Navas A, Miranda A, Garcia L et al. Clinical and Microbiological profile of infectitious keratitis in children. BMC Ophtalmol. 2013; 13: 54.
10. Yu MCZ, Lima AL, Furtado GHC. Microbiolo-gical and epidemiological study of infectitious keratitis in children and adolescents. Arq Bras Ophalmol. 2016;79 (5).
11. Al-yousuf N. Microbial keratitis in kingdom of Bahrain: Clinical and microbiology study. Middle East Afr J Ophthalmol. 2009;16(1): 3-7.
12. Hsiao CH, Yeung L, Ma DH, Chen YF, Lin HC, Tan HY. Pediatric microbial keratitis in Taiwanese children: a review of hospital cases. Arch Ophthalmol. 2007;125(5):603-9.
13. Ormerod LD, Murpdree AL, Gomez DS, Schanzlin DJ, Smith RE. Microbial keratitis in children. Ophthal. 1986;93(4):449-55.
14. Wong VW, Lai TY, Chi SC, Lam DS. Pediatrics ocular surface infections: a 5 year review of demographics, clinical features, risk factors, microbiological results and treatment. Cornea. 2011; 30(9): 995-1002.
15. Jeng BH, McLeod SD. Microbial keratitis. British J Ophthal. 2003;87:805-808.
16. Miller MJ, Wilson LA, Ahearn DG. Adherence of pseudomonas aeruginosa to rigid gas permeable contact lens. Arch Ophthal. 1991; 109:1447-1448.
17. Bharathi MJ, Ramakrishnan R, Meenakshi CS. Ulcerative keratitis associated with contact lens wear. Indian J Ophthal. 2007;551:64-67.
18. Chowdhary A, Singh K. Spectrum of fungal keratitis in North India. Cornea. 2005;23:8-15.
19. Jadhav SV, Gandham NR, Misra RN, Ujagare MT, Sharma M, Sardar M. prevalence of fungal keratitis from tertiary care hospital from western part of India. Int J Microbiol Res. 2012; 4:207-10

Cite this article as: Mahalle R, Dehankar U. Microbiological Profile of Infectious Keratitis Reported in a Tertiary Care Hospital of Central India. PJSR ;2020:13(1):26-29.
Source of Support : Nil, Conflict of Interest: None declared.