

Assessment of Incidence of Bacterial Pathogens Causing Ocular Infections: An Observational Study

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ABSTRACT

Background: Bacteria contribute for major etiologic component for ocular pathologies. Bacterial conjunctivitis is commonly seen in children and the elders but can also be presented among neonates and adults. Hence; we planned the present study to assess the incidence of bacterial pathogens causing ocular infections.

Materials & Methods: The present study included assessment of incidence of bacterial pathogens causing ocular infections. A total of 100 patients (eyes) were included in the present study. Evaluation of all the patients was done, who reported to the department of ophthalmology. All the patients were examined slit-lamp bio-microscope and bacterial infections were diagnosed by experienced and skilled ophthalmology. All the results obtained were summarized and assessed by SPSS software.

Results: Commonly seen ocular infection in the present study was Blepharitis, ulcerative scleratitis, ulcerative keratitis and corneal infection. Gram positive cocci were the most commonly isolated bacterial specimens in the present study. Among these gram positive cocci, the most commonly isolated were *S. aureus*, *S. pneumoniae*, *S. pyogenes* and *S. viridans*. Gram

positive bacilli were the most common bacterial pathogen seen, after gram positive cocci. Among them, most commonly encountered were bacillus spp. and corynebacterium spp.

Conclusion: Gram positive cocci are the most commonly obtained bacterial specimens in patients with ocular infections.

Key words: Bacterial, Incidence, Ocular.

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INTRODUCTION

The human eye which is relatively impermeable to most environmental agents is one of the most complex sensory organs of the human body. However, in certain circumstances, infectious agents gain access into the eye, following different routes and cause infection. Trauma, surgery and systemic diseases are among the contributing factors as routes of entry for infectious agents.^{1,2}

Conjunctivitis, inflammation of the mucosa of conjunctiva, is the most frequent ocular case with noticeable economic and social burdens. During chronicity, the disease can affect not only the conjunctiva but also adjacent structures including the eye lid and can be a potential risk for other extra or intraocular infections.^{3,4} Bacteria contribute for about 50–70% of infectious conjunctivitis. Bacterial conjunctivitis is commonly seen in children and the elders but can also be presented among neonates and adults.⁵⁻⁸ Hence; we planned the present study to assess the incidence of bacterial pathogens causing ocular infections.

MATERIALS & METHODS

The present study was planned in the Department of Ophthalmology, Amaltas Institute of Medical Sciences, Dewas, Madhya Pradesh (India) and it included assessment of incidence of bacterial pathogens causing ocular infections. A total of 350 (eyes) patients were included in the present study. Evaluation of all the patients was done, who reported to the department of ophthalmology. Exclusion criteria for the present study included:

- Subjects less than 20 years of age, or more than 60 years of age,
- Subjects with positive history of any other systemic illness,
- Subjects with presence of any form hypersensitive reaction

All the patients were examined slit-lamp bio-microscope and bacterial infections were diagnosed by experienced and skilled ophthalmology. Detailed ocular examination was carried out in all the patients. Culture and smear were obtained from all the patients by using scraping and swabbing the margin eyelid. Sheep

blood agar, chocolate agar and non-nutrient agar were used for culturing the obtained specimens. All the results obtained were summarized and assessed by SPSS software. Chi-square test was used for assessment of level of significance.

RESULTS

In the present study, we assessed a total of 350 patients, with mean age of 31.5 years. There were 100 patients of less than 25 years of age. There were 150 patients within age group of 25 to 40 years. There were 100 patients more than 40 years of age.

There were 210 males and 140 females in the present study. Commonly seen ocular infection in the present study was Blepharitis, ulcerative scleratitis, ulcerative keratitis and corneal infection. Gram positive cocci were the most commonly isolated bacterial specimens in the present study. Among these gram positive cocci, the most commonly isolated were *S. aureus*, *S. pneumoniae*, *S. pyogenes* and *S. viridans*. Gram positive bacilli were the most common bacterial pathogen seen, after gram positive cocci. Among them, most commonly encountered were *Bacillus* spp. and *Corynebacterium* spp.

Table 1: Demographic data of the patients

Parameter		Number
Age group	Less than 25 years	100
	25 to 40 years	150
	More than 40 years	100
Gender	Males	210
	Females	140

Table 2: Bacteriological profile of ocular specimens

Name of bacterial specimen	Blepharitis	Ulcerative Scleratitis	Ulcerative keratitis	Corneal infection	Others	
Gram positive cocci	<i>S. aureus</i>	30	35	54	43	30
	<i>S. pneumoniae</i>	15	20	32	42	10
	<i>S. pyogenes</i>	3	14	15	20	8
	<i>S. viridans</i>	1	2	3	2	1
Gram positive bacilli	<i>Bacillus</i> spp.	2	3	0	0	1
	<i>Corynebacterium</i> spp.	1	1	1	0	2
Gram negative cocci	<i>Moraxella</i> spp.	1	0	1	1	1
	<i>Neisseria</i> spp.	2	1	0	0	1
Gram negative bacilli	<i>Pseudomonas</i> spp.	0	0	1	0	0
	<i>E. coli</i>	1	0	0	1	1
	<i>Proteus</i> spp.	0	1	0	0	1
	<i>Klebsiella</i> spp.	0	0	0	1	1
	Others	0	0	0	0	1
Mixed	5	10	12	13	10	

DISCUSSION

In the present study, we assessed a total of 350 patients, with mean age of 31.5 years. Ramesh S et al identified the specific bacterial pathogens causing ocular infections and to determine their in-vitro antibacterial susceptibilities to commonly used antibacterial agents. A retrospective analysis of all patients with clinically diagnosed bacterial ocular infections such as blepharitis, conjunctivitis, internal and external hordeolum, suppurative scleritis, canaliculitis, keratitis, dacryocystitis, preseptal cellulitis, endophthalmitis and panophthalmitis presenting between January 2005 and December 2005 was performed. Extra-ocular and intra-ocular specimens were collected and were subjected to direct microscopy and culture. A total of 756 patients with bacterial ocular infections were analyzed, of which 462 (61%) eyes had adnexal bacterial infection, 217 (28.7%) had corneal infection, 6 (0.8%) had scleral involvement and the remaining 71 (9.39%) eyes had infection of the intra-ocular tissues. The predominant bacterial species isolated was *S. aureus* (195 of 776; 25%)

followed by *S. pneumoniae* (169 of 776; 21.78%) and coagulase negative staphylococci (142 of 776; 18.3%). The largest number of gram-positive isolates were susceptible to cefazolin (545 of 624; 87.34%), chloramphenicol (522 of 624; 83.65%) and gatifloxacin (511 of 624; 81.89%) and gram-negative isolates were to amikacin (127 of 136; 93.38%), gatifloxacin (125 of 136; 91.91%) and ofloxacin (119 of 136; 87.5%), while aerobic actinomycetes were to amikacin (100%), gatifloxacin (14 of 16; 87.5%), chloramphenicol (14 of 16; 87.5%) and ofloxacin (13 of 16; 81.25%). *S. aureus* frequently causes infections of eyelids and conjunctiva, *S. pneumoniae* of lacrimal apparatus and cornea and coagulase negative staphylococci causes intra-ocular infections.⁹ There were 100 patients of less than 25 years of age. There were 150 patients within age group of 25 to 40 years. There were 100 patients more than 40 years of age. There were 210 males and 140 females in the present study. Commonly seen ocular infection in the present study was Blepharitis, ulcerative scleratitis,

ulcerative keratitis and corneal infection. Gram positive cocci were the most commonly isolated bacterial specimens in the present study. Among these gram positive cocci, the most commonly isolated were *S. aureus*, *S. pneumoniae*, *S. pyogenes* and *S. viridans*. Gram positive bacilli were the most common bacterial pathogen seen, after gram positive cocci. Among them, most commonly encountered were bacillus spp. and corynebacterium spp.

Pathengay A et al presented the microbial spectrum and susceptibility of isolates in scleral buckle infections in India. Seventy-three isolates from 55 eyes with scleral buckle infection were studied. The isolates included 30 gram-positive cocci (41.1%), 15 acid-fast bacilli (20.5%), 11 fungi (15.1%), 10 gram-positive bacilli (13.7%), and 7 gram-negative bacilli (9.6%). Eighteen eyes (32.7%) had polymicrobial infections. Gram-positive, gram-negative, and acid-fast isolates were most commonly susceptible to vancomycin (93%), ciprofloxacin (86%), and amikacin (80%), respectively. This large single-center study indicates the high prevalence of fungal, acid-fast organisms and polymicrobial organisms in buckle infections.¹⁰

Bharathi MJ et al determined the influence of risk factors, climate, and geographical variation on the microbial keratitis in South India. A standardised form was filled out for each patient, documenting sociodemographic features and information pertaining to risk factors. Corneal scrapes were collected and subjected to culture and microscopy. A total of 3,183 consecutive patients with infective keratitis were evaluated, of which 1,043 (32.77%) were found to be of bacterial aetiology, 1,095 (34.4%) were fungal, 33 (1.04%) were *Acanthamoeba*, 76 (2.39%) were both fungal and bacterial, and the remaining 936 (29.41%) were found to be culture negative. The predominant bacterial and fungal pathogens isolated were *Streptococcus pneumoniae* (35.95%) and *Fusarium* spp. (41.92%), respectively. Most of the patients (66.84%) with fungal keratitis were between 21 and 50 years old, and 60.21% of the patients with bacterial keratitis were older than 50. A majority of patients (64.75%) with fungal keratitis were agricultural workers, whereas bacterial keratitis occurred more commonly (57.62%) in nonagricultural workers. Corneal injury was identified in 2,256 (70.88%) patients, and it accounted for 92.15% in fungal keratitis and 100% in *Acanthamoeba* keratitis. Injuries due to vegetative matter (61.28%) were identified as a significant cause for fungal keratitis and due to mud (84.85%) for *Acanthamoeba* keratitis. Coexisting ocular diseases predisposing to bacterial keratitis accounted for 68.17%. The incidence of fungal keratitis was higher between June and September, and bacterial keratitis was less during this period. The risk of agricultural predominance and vegetative corneal injury in fungal keratitis and associated ocular diseases in bacterial keratitis increase susceptibility to corneal infection.¹¹

CONCLUSION

Gram positive cocci are the most commonly obtained bacterial specimens in patients with ocular infections. However; further studies are recommended.

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