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Research Article

Profile of patients with ocular infections attending the out-patient department of a tertiary care centre in south India

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ABSTRACT

Background: Bacterial and viral etiologies are most commonly blamed for ocular infections. Studies have shown that gram positive cocci are responsible for maximum number of infections, followed by anaerobic bacteria and gram negative bacilli. Infections of the ocular adnexa, ocular surface and orbit usually present as conjunctivitis, keratitis, scleritis, orbital cellulitis and periorbital necrotising fascitis. The intra-ocular infections usually occur subsequently to a corneal ulcer, penetrating eye injury or a severe blood stream infection, and presents as iritis, uveitis, chorioretinitis or endophthalmitis. The aim of the study was to find out the clinico-demographic profile of patients who were diagnosed to have ocular infections at a large tertiary care teaching hospital in south India.
Methods: A retrospective study was designed to include all patients who came with suspected ocular infections to the out-patient department (OPD) of Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India, from July 2015 to December 2015.
Results: More than 50% of the participants reported ocular pain and around 60% has redness of the affected eye. Twenty five percent of the participants had discharge from the eyes and 56.7% reported persistent watering. Around 60% of the patients had irritation of the eye, while only 16.7% said that they feel blurring of vision. The final diagnosis was formed after careful examination by the senior most consultants available at the OPD and relevant investigations. Among the participants, 36.6% had conjunctivitis and 16.6% had corneal ulceration due to an infective cause. Around 13% has corneal abrasion, 11.6% had foreign body, 3% had dry eye and 3% had dacrocystitis.
Conclusions: Only around 55% of the patients with suspected eye infections turned out to be actual infections and a vast majority of that was due to conjunctivitis. Though majority of the patients presented with pain, redness, watering and discharge, these symptoms/signs cannot be used to differentiate infective etiology from a non-infective one.

Keywords: Eye infections, Eye diseases, Etiology, India, Epidemiology, Anti-bacterial agents, Pharmacology

INTRODUCTION

Eye has a unique defense system against infections. The conjunctiva, constant blinking action of eyelids, lysozyme and immunoglobulins in tears and the normal bacteriological flora provide different layers of protection against ocular infections.[1] When this protective system gets breached due to various reasons, it results in eye infections which can cause various types of morbidity. The infections of conjunctiva and cornea generally presents with eye pain, irritation, redness and photo-phobia. Most of these infections can be managed in a primary level and referral should be done if complications are suspected. The infections inside the

eyeball (endophthalmitis) have devastating complications and care should be taken to ensure the attention of a qualified ophthalmologist as early as possible. The infections of the surrounding soft tissue can also spread to the eye in many cases causing damage to structures inside the eyeball. It can also cause damage to the optic nerve and can spread to the brain through the optic nerve.[2]

Bacterial and viral etiologies are most commonly blamed for ocular infections. Studies have shown that gram positive cocci are responsible for maximum number of infections, followed by anaerobic bacteria and gram negative bacilli.[3] A study done in south India showed that the largest load of eye infections were due to *Staphylococcus aureus* (25%), *Streptococcus pneumoniae* (22%) and Coagulase negative *Staphylococci* (18%).[4] Among the viruses implicated for eye infections, *Herpes simplex* virus, *Herpes zooster* virus and Adenovirus comes on top of the list.[5]

Apart from the routine etiological causes of ocular infections, a few other organisms have also been implicated in the recent years. Fungal and parasitic infections of the eye are on the rise, especially in those who are immuno- suppressed, on long term steroidal therapy or who suffered penetrating eye trauma. Fungal keratitis, fungal endophthalmitis and even fungal chorio-retinitis are seen more commonly in ophthalmology out-patient departments. *Candida spp*. and *Acanthamoebae spp*. are the most common culprits among fungi and parasites respectively.[6]

Infections of the ocular adnexa, ocular surface and orbit usually present as conjunctivitis, keratitis, scleritis, orbital cellulitis and periorbital necrotising fascitis. The intra-ocular infections usually occur subsequently to a corneal ulcer, penetrating eye injury or a severe blood stream infection, and presents as iritis, uveitis, chorioretinitis or endophthalmitis. The varied presentations make it a diagnostic dilemma, even though prompt care is needed to prevent long term damage and disability.[7] Another problem encountered in efficient management of eye infections is the increasing antibiotic resistance among organisms causing these infections. Ophthalmologists have access to topical, subtenon, intra-ocular and systemic antibiotics, part from fortified preparations made from parenteral formulations. Usually these formulations achieve much higher concentrations than minimum inhibitory concentration (MIC) and therefore chances of induced antibiotic resistance were traditionally considered low. But in line with other reasons for antibiotic resistance, the ocular organisms have also started to acquire resistance to commonly used antibiotics, especially fluoroquinolones.[8] Studies have shown that between 19% to 60% of *Staphylococcus aureus* and *Streptococcus pneumoniae* isolates from ophthalmic infections were resistant to macrolides, penicillins and commonly used older fluoroquinolones. Although fluoroquinolones are still used as first line topical agents in ophthalmic infections, it was found that more than 85% of the methicillin resistant *Staphylococcus aureus* (MRSA) isolates from eye was resistant to even newer antibiotics like moxifloxacin and gatifloxacin.[9]

The aim of the study was to find out the clinico-demographic profile of patients who were diagnosed to have ocular infections at a large tertiary care teaching hospital in south India. The study also tried to find out whether symptomatology at initial presentation can be used to predict the final diagnosis of the infective etiology in case of ocular infections.

METHODS

A retrospective study was designed to include all patients who came with suspected ocular infections to the outpatient department (OPD) of Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India, from July 2015 to December 2015. Pushpagiri Medical College Hospital is a tertiary care teaching hospital which runs post graduate courses in ophthalmology. It generally services patients from the surrounding districts of Pathanamthitta, Kottayam and Alleppey, which are among the most developed districts in India in terms of human development index (HDI).

All patients who attended the ophthalmology OPD and who were suspected to have an eye infection by the treating resident/consultant were included in the study. The initial diagnosis was considered as the inclusion criteria and all patients with signs/symptoms of infection were included into the study. Among those participants satisfying the inclusion criteria, those who had pre-existing orbital mucormycosis and chronic dacrocystitis were excluded from the study. The data on the participants were obtained from the patient records maintained in medical records department (MRD) of the hospital. Information on demographic characteristics, symptomatology, clinical course, complications and treatment, were obtained from the medical records.

The clinico-demographic profile of the participants, the final diagnosis and the treatment course was tabulated, and association of the presenting symptoms with final diagnosis was found out using tests of proportions. The data was digitized using a data entry platform created using Epi-Info 7.0, free software brought out by centers for disease control, Atlanta, USA. The data analysis was done using the statistical package of Epi-info 7.0.

RESULTS

A total of 60 participants were recruited into the study after obtaining written informed consent. Among the participants, the majorities were from the age group 18 to 59 years (71.7%) and around 60% were females.

Most of the participants (68.3%) had symptoms lasting 1 day to 1 week, with only 15% having symptoms for more than 1 week. A vast majority of the patients (93.3%) did not seek any medical attention before presentation to the ophthalmology OPD. Around 10% of the participants were suffering from diabetes mellitus, 3.3% had hypertension and another 3.3% had dyslipidemia. Only 6.7% of the patients reported similar symptoms in the past (Table 1).

Table 1: Baseline socio-demographic characteristics.

Characteristic	Frequency	Percentage
Age		
Upto 18 years	9	15.0
18 to 59 years	43	71.7
60 and above	8	13.3
Sex		
Male	24	40.0
Female	36	60.0
Duration of symptoms		
Upto 1 day	10	16.7
1 day to 1 week	41	68.3
More than 1 week	9	15.0
History of treatment		
Yes	4	6.7
No	56	93.3
Diabetes		
Yes	6	10.0
No	54	90.0
Hypertension		
Yes	2	3.3
No	58	96.7
Dyslipidemia		
Yes	2	3.3
No	58	96.7
Similar past history		
Yes	4	6.7
No	56	93.3

Table 2: Symptoms/signs on presentation.

Symptom/sign	Frequency	Percentage
Pain	31	51.7
Redness	37	61.7
Discharge	15	25.0
Watering	34	56.7
Irritation	35	58.3
Blurring	10	16.7
Injury	5	8.3

More than 50% of the participants reported ocular pain, and around 60% has redness of the affected eye. Twenty five percent of the participants had discharge from the eyes and 56.7% reported persistent watering.

Around 60% of the patients had irritation of the eye, while only 16.7% said that they feel blurring of vision (Table 2).

The final diagnosis was formed after careful examination by the senior most consultant available at the OPD and relevant investigations. Among the participants, 36.6% had conjunctivitis and 16.6% had corneal ulceration due to an infective cause.

Around 13% has corneal abrasion, 11.6% had foreign body, 3% had dry eye and 3% had dacrocystitis (Table 3).

Table 3: Final diagnosis of participants.

Diagnosis	Frequency	Percentage
Conjunctivitis	22	36.6
Corneal ulcer	10	16.6
Corneal abrasion	8	13.3
Foreign body	7	11.6
Dacrocystitis	3	5.0
Dry eye	3	5.0
Others	7	11.6

Table 4: Association of symptoms/signs and infective etiology.

Characteristic	Infective etiology (number/percentage)	Non infective etiology (number/percentage)	P-value	OR (95% CI)
Age upto 18 years	7 (77.8%)	2 (22.2%)	0.281	2.45 (0.46 to 12.98)
Duration upto 3 days	24 (55.8%)	19 (44.2%)	0.138	0.38 (0.10 to 1.38)
Pain	18 (58.1)	13(41.9%)	0.553	0.72 (0.25 to 2.07)
Redness	22 (59.5%)	15 (40.5%)	0.656	0.78 (0.26 to 2.30)
Discharge	10 (66.7%)	5 (33.3%)	0.646	1.33 (0.39 to 4.55)
Watering	21 (61.8%)	13 (38.2%)	0.986	1.01 (0.35 to 2.88)
Irritation	22 (62.9%)	13 (37.1%)	0.822	1.12 (0.39 to 3.23)

The data was further analysed to look for any possible association of symptoms/signs with infective etiology. For this all the participants who had conjunctivitis and corneal ulceration were clubbed together as having an infective etiology. It was found that age, duration of symptoms, pain, redness, discharge, watering and irritation were not significantly associated with infective etiology (Table 4). The treatments given to the participants were also documented in the study. Almost

90% of those who had conjunctivitis or corneal ulceration were given topical antibiotics.

Oral non-steroidal anti-inflammatory drugs (NSAIDS) were also prescribed to some participants in view of the pain and discomfort associated with these conditions. Around 40% of those participants with conjunctivitis and 80% of those with corneal ulceration were given artificial tears for lubrication and to ease discomfort. Forty percent of participants with corneal ulcers were also given topical steroids. The treatment modalities followed standard international guidelines, and were tailor made according to the needs of each patient (Table 5).

Table 5: Treatment provided to those with confirmed infective etiology.

Treatment modality	Conjunctivitis (n=22)	Corneal ulcer (n=10)
Topical antibiotics	19 (86.4%)	9 (90.0%)
Oral antibiotics	1 (4.5%)	0
Topical NSAIDS	1 (4.5%)	1 (10.0%)
Oral NSAIDS	5 (22.7%)	2 (20.0%)
Artificial tears	9 (40.9%)	8 (80.0%)
Topical steroids	0	4 (40.0%)

DISCUSSION

Conjunctivitis was the most common infective etiology found during the course of the study. Conjunctivitis is a condition which is seen more commonly in tropical and sub-tropical regions due to high humidity, over-crowding and apparent deficiency in hygiene conditions. Also, the predominant organisms responsible for bacterial conjunctivitis, namely *Staphylococcus aureus* and *Streptococcus pneumoniae* thrives in these conditions and has significant natural reservoirs.[10] Most of the participants in this study presented with pain in the eye, redness, watering and irritation of the eye. The typical presentation of any eye infection involves symptoms/signs like those described above, and serves as a guide for fast and efficient diagnosis of the condition.[11]

In this study, infective etiology was not significantly associated with factors like age, duration of disease, pain, redness, discharge from the eye, watering or irritation. This may be due to the fact that only patients having an initial diagnosis of infection were included in the study, thereby causing a possible selection bias. Other studies have shown that infective etiologies are usually associated with some risk factors, and this can help in predicting the etiology in those patients presenting with various signs and symptoms to the OPD.[12]

The patients with conjunctivitis mainly received topical antibiotics, with some patients being prescribed artificial tears and oral NSAIDs. This line of treatment more or less follows standard international guidelines, though many studies recommend antibiotics in exceptional cases only. Studies have shown that efficacy of antibiotics in resolution of conjunctivitis symptoms are limited and can potentially cause a delay in diagnosing other serious eye conditions. Antibiotics are recommended only in patients with a delayed presentation or in those patients who are likely to develop complications.[13]

In conclusion, only around 55% of the patients with suspected eye infections turned out to be actual infections, and a vast majority of that was due to conjunctivitis. Though majority of the patients presented with pain, redness, watering and discharge, these symptoms/signs cannot be used to differentiate infective etiology from a non-infective one.

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