Section: Ophthalmology

Research

EPIDEMIOLOGICAL AND MICROBIOLOGICAL PROFILE OF INFECTIVE KERATITIS AND ITS OUTCOME: A PROSPECTIVE HOSPITAL BASED STUDY FROM MGM MEDICAL COLLEGE & LSK HOSPITAL. KISHANGANJ (BIHAR)

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Abstract

Background: To find out what causes infectious keratitis and what kinds of microorganisms cause it in patients who came to the OPD of ophthalmology at MGM Medical College and LSK Hospital in Bihar, India. **Materials and Methods:** A prospective hospital-based study was conducted in the Department of Ophthalmology, M.G.M. Medical College & hospital Kishanganj, Bihar. One hundred patients with infective keratitis were included during the study period from June 2020 to May 2021. **Result:** The most common predisposing factor for keratitis observed in the study was trauma with the vegetative matter, which was seen in 36% of the patients. The most common causes of corneal ulcers were trauma from wooden objects (17%), sand/dust matter (14%), and broomstick injury (11%). Because no patients wore contact lenses, contact lens infection was not a risk factor. Ocular surface disease steroid usage and Dacryocystitis was the predisposing factor among 10%, 5% & 2 % of patients, respectively. 75/100 patients with corneal ulcers had a microbial (bacterial and fungal) etiology. Bacteria were isolated in 49 samples; in 24 samples, fungal growth was isolated, and in 2 patients, mixed growth was isolated. **Conclusion:** Understanding the pathogenic organisms responsible and the identification of risk factors helps create a broad strategy for diagnosing and managing corneal ulcers. Trauma with the vegetative object was the most common predisposing factor in the present study. Bacteria are more responsible than fungi, with Staphylococcus aureus being the most common bacterial pathogen and Aspergillus is the most common fungal agent.

INTRODUCTION

Corneal opacity is the fifth most common cause of blindness worldwide, responsible for 3.2% of all cases. A recent World Health Organization (WHO) report stated that trachoma affects 2 million people worldwide, causing blindness or moderate/severe visual impairment.[1] Keratitis-related corneal blindness is a significant public health concern in India. According to the 2011 census and survey (rapid assessment of avoidable blindness) conducted by the Ministry of Health and Family Welfare in 2006-2007, 0.1% (1.22 lakh) of India's total population are bilaterally blind, and 0.9% (10.98 lakh) are unilaterally blind.[2]

Bacteria, fungi, protozoa, and viruses are some of the many possible pathogens that can bring on IK. Furthermore, it has been established that polymicrobial infection is responsible for 2-15% of all IK cases.

Fear of blindness and the associated social stigma had a significant psychological impact on these patients, as shown in.[3] Compared to controls, QoL scores were lower for those with IK, even after full visual recovery.[4] Changes in patient population, corneal health, geographical location, climate, and over time all play a role in the etiological and epidemiological patterns of corneal ulceration. Thus, early diagnosis, prompt therapy initiation, optimal disease management, and prevention hinge on familiarity with the epidemiological characteristics, risk factors, and etiological agents prevalent in a given area Lab tests, such as microscopy and culture of corneal scrapings, must be performed. With great care before any targeted treatment can begin.

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This study was conducted at M.G.M. Medical College & L.S.K. Hospital in Kishangnaj, Bihar, India, a tertiary care facility, to determine the microbial etiology of Infective keratitis and to identify risk factors predisposing to corneal infections.

MATERIALS AND METHODS

A prospective hospital-based study was conducted in the Department of Ophthalmology, M.G.M. Medical College & hospital Kishanganj, Bihar. One hundred patients with infective keratitis were included during the study period from June 2020 to May 2021.

Inclusion Criteria

- To be included in the study are all patients with infective keratitis symptoms who presented to MGM Medical College and LSK hospital during the study period.

Exclusion Criteria

- Viral ulcers
- Neurotrophic ulcers
- Healing ulcers
- Ulcers resulting from autoimmune disorders were excluded
- Who was not willing in our study

All pertinent data, including demographics, clinical characteristics, treatment, risk factors, etc., were recorded using a standardized proforma. The research was carried out with participants' informed consent approved by the institutional ethical committee.

Corneal scrapings were collected using a sterile blade after a thorough ocular examination was performed with the slit-lamp biomicroscope. We injected lignocaine at an intensity of 4% without any preservative right before taking the samples. The entire operation was carried out using slit-lamp magnification. The corneal ulcer base and edge scrapings were inoculated onto the solid media in a C-shaped streak row and then transferred to the liquid media. Blood agar, chocolate agar, Sabouraud dextrose agar (SDA), and liquid media like thioglycollate medium were used as growth substrates. Scratchings were then used for a wet mount with 10% potassium hydroxide (KOH) and Gram staining. The transfer of the samples onto the culture media and their subsequent transport to the lab

was performed under strict conditions of asepsis.

All collected data were analyzed with appropriate charts, graphs, and tables, and the results were discussed in great depth so that reasonable conclusions could be drawn from the data. Statistical Package for the Social Sciences (SPSS) Inc., Chicago, USA; Version 19.0 was used for the data analysis. Normal distributions and standard deviations were used to describe continuous variables (SD). Numeral and percentage representations of categorical variables were used.

RESULTS

Depicts the data regarding the age distribution of the study participants. The mean age was 41.43 ±15.36 (ranging from 11 to 75 years). The age group 31-40 years (25%) had the most patients, followed by 20-30 years (23%). >70 years was the least common age group (5%).

Table 1: Age Distribution

Age Group (years)	Frequency	Percentage
<20 years	6	6.0
20-30 years	23	23.0
31-40 years	25	25.0
41-50 years	17	17.0
51-60 years	16	16.0
61-70 years	8	8.0
>70years	5	5.0
Total	100	100.0
Mean Age	41.43 ±15.36	

Table 2: Sex Distribution

Sex	Frequency	Percentage
Male	58	58.0
Female	42	42.0
Total	100	100.0

There were (58%) 58 males and (42%) 42 females in the present study. The male-to-female ratio was 1.38:1.

Table 3: Risk Factors

Risk Factors	Frequency	Percentage
Trauma with vegetative matter	36	36.0
Wooden objects	17	17.0
Sand/ dust	14	14.0
Broomstick	11	11.0

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Ocular surface disease	10	10.0
Steroid Usage	5	5.0
Unknown	5	5.0
Dacryocystitis	2	2.0
Total	100	100.0

The most common predisposing factor for keratitis observed in the study was trauma with the vegetative matter, which was seen in 36% of the patients. The most common causes of corneal ulcers were trauma from wooden objects (17%), sand/dust matter (14%), and broomstick injury (11%). Because no patients wore contact lenses, contact lens infection was not a risk factor. Steroid use for ocular surface disease and Dacryocystitis were predisposing factors in 10%, 5%, and 2% of patients. Dacryocystitis was the predisposing factor among 10% , 5% & 2 % patients respectively.

Table 4: Type of microorganism.

Type of microorganism	Frequency	Percentage
Bacterial Isolate	49	49.0
Fungal Isolate	24	24.0
Mixed Growth	2	2.0
No Isolate	25	25.0
Total	100	100.0

75 out of 100 patients who presented with corneal ulcers had a microbial (bacterial and fungal) origin. The remaining 25 samples contained no isolated organisms. In 49 samples, bacteria were isolated; in 31 samples, fungal growth, and 2 patients, mixed growth.

Table 5: Type of Bacterial Pathogens (n= 49)

Type of Bacterial Pathogens	Frequency	Percentage
Gram-positive cocci	29	59.2
Gram-negative bacilli	20	40.8
Total	49	100.0

Gram-positive cocci (GPC) made up 29 (59.2%) of the total number of positive bacterial cultures, whereas Gram-negative bacilli were found in 20 (40.8%). (GNB). There were no Gram-positive bacilli found.

Table 6: Type of Gram-positive Cocci (n= 29)

Gram-positive Cocci	Frequency	Percentage
Staphylococcus aureus	16	55.2
Coagulase-negative Staphylococci	12	41.4
Micrococcus	1	3.4
Total	29	100.0

Among 29 gram-positive cocci, Staphylococcus aureus (55.2%) was the most common gram-positive cocci, followed by coagulase-negative Staphylococcus (41.4%) and Micrococcus (3.4%)

Table 7: Type of gram-negative bacilli (n=20)

Gram-negative bacilli	Frequency	Percentage
Pseudomonas spp.	10	50.0
Klebsiella spp.	4	20.0
Enterobacter spp.	2	10.0
E. coli	2	10.0
Proteus spp.	1	5.0
Acinetobacter spp.	1	5.0
Total	20	100.0

Among 20 gram-negative bacilli, the most common was Pseudomonas spp. (50%) followed by Klebsiella spp. (20%) Enterobacter spp. (10%), E. coli. (10%) Proteus (5%) and Acinetobacter (5%) were among the other Gram-negative isolates

Table 8: Fungal Isolates

Fungal Isolates	Frequency	Percentage
Aspergillus spp.	9	37.5
Fusarium spp.	5	20.8
Curvularia spp.	4	16.7
Candida spp.	3	12.5
Unidentified	3	12.5
Total	24	100.0

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The most common fungal species were Aspergillus spp. (37.5%) followed by Fusarium spp. (20.8%). The least common incidence was Curvularia spp. (16.7%) and Candida spp. (12.5%)

DISCUSSION

Microbial keratitis, or infectious keratitis, is an infection of the cornea caused by a wide range of microorganisms and constitutes a true medical emergency.[5] An early aetiological diagnosis allows for the start of aggressive, targeted treatment that may prevent adverse outcomes.[6]

A common ocular infection called microbial keratitis can be caused by bacteria, fungi, viruses, or parasites, and it can threaten the patient's vision. The importance of corneal ulceration as a cause of visual loss has been highlighted by numerous studies reporting the frequency of microbial infections and identifying the risk factors predisposing a population to corneal disease in India.[7,8]

This study was to: (1) better understand the types of bacteria and viruses that cause infectious keratitis and (2) better understand the demographics and risk factors associated with this condition. Antibiotic sensitivity was also evaluated, as were patterns of antibiotic resistance found upon bacterial isolation.

This research was carried out at the M.G.M. medical college & hospital in Kishanganj, Bihar, specifically in the Ophthalmology Department. One hundred people were analyzed for infective keratitis.

The average age was 41.43 and 15. Thirty-six years (ranging from 11 years to 75 years). Patients aged 31–40 accounted for the largest share (25%), followed by those aged 20–30 (23%). Those older than 70 made up the smallest percentage (5%). This data suggests that those of physically active age are more likely to develop IK.

A similar study in South Kerala corroborated the findings of Reena Anie Jose et al., who found an increased prevalence of infective keratitis among people aged 40 to 59.

This trend may be because older people are disproportionately affected by various predisposing diseases (both systemic and local), as mentioned in.[9]

Corneal ulceration was observed in all age groups, with a higher prevalence among physically active adults, as reported by Tewari et al.[10] In Kashmir (65%), South India (65% and 56.7%), and Ghana (69.3%), Men were more likely to have it than women.

According to research by Reena Anie Jose et al,[11] corneal injury is associated with an increased risk of infective keratitis in 59.26% (80/135) cases.

According to another study,[9] similar results were found in Madurai (65.4%), Tirunelveli (71.5%; South India), East India (82.9%), North India (72%), Nepal (60%), and Vietnam (49.95%).[7] Seventy-five of this study's patients with corneal ulcers had a microbial (bacterial or fungal) etiology. In the remaining 25 samples, no organism was found. In 49 of the samples, bacteria were found; in 31 of the samples, fungi were found; and in 2 patients, both types of growth were found.

Researchers Reena Anie Jose et al. found that out of 135 cases of corneal ulcers, 48 (35.56%) were culture-positive.

Almost in agreement with the current study is a report by Geethakumari et al,[9] that found a lower isolation rate of 21.26% and 28.09%, respectively, in Trivandrum.[12]

Gram-positive cocci (GPC) made up 29 (59.2%) of the total number of positive bacterial cultures, whereas Gram-negative bacilli made up 20 (40.8%). (GNB). No Gram-positive bacilli were observed. Among 29 gram-positive cocci, Staphylococcus aureus (55.2%) was the most common gram-positive cocci, followed by coagulase-negative Staphylococcus (41.4%) and Micrococcus (3.4%).

Reena Anie Jose et al., in their study, reported among the culture-positive cases, bacterial isolates constituted 52.08%, and the rest were fungal (47.92%). In their research, Out of the 25 bacterial isolates, 16 (64%) were found to be Gram-positive cocci, and the rest were Gram-negative bacilli (36%). Staphylococcus epidermidis was the predominant bacterial isolate in the present study (8 cases, 32%), followed by Streptococcus pneumonia (4 cases, 16%), Pseudomonas (4 cases, 16%), and Staphylococcus aureus (3 cases, 12%).[9]

Many authors from Madurai, Hyderabad, and Ahmedabad have observed a higher incidence of bacterial isolates compared to fungi.[13]

Other research found that Streptococcus pneumoniae was the most common type of bacteria in places like Kashmir and South India. Possible explanations for the lack of success in isolating corneal pathogens in this study include differences in prevalence between regions.[14]

One possible explanation is that lacrimal sac disease was not identified as a substantial risk factor in this investigation.

Among 20 gram-negative bacilli, the most common was Pseudomonas spp. (50%) followed by Klebsiella spp. (20%) Enterobacter spp. (10%), E. coli. (10%) Proteus (5%) and Acinetobacter (5%) were among the other Gram-negative isolates.

Tewari et al., in their study, reported similar findings.[13] They said Gram-negative bacilli (39.7% of total bacterial pathogens) also correlate well with other studies.[14]

Among 20 gram-negative bacilli, the most common was Pseudomonas spp. (50%) followed by Klebsiella spp. (20%) Enterobacter spp. (10%), E. coli. (10%) Proteus (5%) and Acinetobacter (5%) were among the other Gram-negative isolates.

Twenty-four of the samples were found to have fungal growths. The majority (75%) of the fungal isolates were filamentous fungus, while the remaining (12.5%) were yeast. Despite extensive examination, the identities of three (12.5%) of the fungal growths were not determined.

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The most common fungal species were Aspergillus spp. (37.5%) followed by Fusarium spp.(20.8%). The least common incidence was Curvularia spp.(16.7%) and Candida spp.(12.5%).

CONCLUSION

- 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.
- The physically active age group is more prone to infectious keratitis.
- Males are more prone to corneal ulcers than females as they are more involved in outdoor activities.
- Trauma with the vegetative object was the most common predisposing factor in the present study.
- It has been determined that bacteria are more responsible than fungi, with Aspergillus being the primary fungal agent and Staphylococcus aureus being the most common bacterial pathogen.

REFERENCES

1. Flaxman SR, Bourne RRA, Resnikoff S, Ackland P, Braithwaite T, Cicinelli MV, et al. Global causes of blindness and distance vision impairment 1990-2020: a systematic review and meta-analysis. Lancet Glob Health. 2017;5:e1221–e34.
2. Population Census of India; 2011. Last updated on 2018 Nov 30.
3. Ting DSJ, Ho CS, Cairns J, Elsahn A, Al-Aqaba M, Boswell T, et al. 12-year analysis of incidence, microbiological profiles and in vitro antimicrobial susceptibility of infectious keratitis: the Nottingham Infectious Keratitis Study. Br J Ophthalmol. 2020.
4. Arunga S, Wiafe G, Habtamu E, Onyango J, Gichuhi S, Leck A, et al. The impact of microbial keratitis on quality of life in Uganda. BMJ Open Ophthalmol. 2019;4:e000351.
5. Andrew A. Dahl F. Keratitis: Read about Symptoms and Infection Treatment [Internet]. MedicineNet. 2014
6. Resnikoff S, Pascolini D, Etya'ale D, Kocur I, Pararajasegaram R, Pokharel GP, et al. Global data on visual impairment in the year 2002. Bulletin of the World Health Organization. 2004; 82:844–51.
7. Basak SK, Basak S, Mohanta A, Bhowmick A. Epidemiological and microbiological diagnosis of suppurative keratitis in Gangetic West Bengal, Eastern India. Indian J Ophthalmol 2005;53:17-22.
8. Hagan M, Wright E, Newman M, Dolin P, Johnson GJ. Causes of suppurative keratitis in Ghana. Br J Ophthalmol 1995;79:1024-8.
9. Reena Anie Jose, VijayaKumarS, Rajini KC, Prithi NairK, 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): MO06-MO11
10. Tewari A, Sood N, Vegad MM, Mehta DC. Epidemiological and microbiological profile of infective keratitis in Ahmedabad. Indian J Ophthalmol 2012;60:267-72.
11. 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;48:273-7.
12. Geethakumari PV, Remya R, Girijadevi PS, Reena A . Bacterial [2]keratitis and fungal keratitis in South Kerala: A comparative study. Kerala Journal of Ophthalmology. 2011;23(1):43-46.
13. Tewari A, Sood N, Vegad MM, Mehta DC. Epidemiological and microbiological profile of infective keratitis in Ahmedabad. Indian J Ophthalmol 2012;60:267-72.
14. Srinivasan M, Gonzales CA, George C, Cevallos V, Mascarenhas JM, Asokan B, et al. Epidemiology and aetiological diagnosis of corneal ulceration in Madurai, south India. Br J Ophthalmol 1997;81:965-71.

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