

A study on microbiological profile of keratitis in diabetic patients and relation to its predisposing factors in a tertiary care hospital

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Abstract: *Microbial keratitis is a significant public health problem, and numerous studies have been performed describing the microbiology of corneal infection. On a global level, predisposing risk factors for microbial keratitis vary tremendously with geographical location. Although non-surgical trauma to the eye accounted for 48.6–65.4% of all corneal ulcers in the developing countries of Nepal and India, non-surgical eye trauma accounted for only 27% of all cases. Our study was conducted between June 2017 to December 2017 in Government Mohan Kumaramangalam Medical college Hospital, Salem, Tamilnadu, based on patients presenting with corneal ulcers. This study conducted on diabetic patients presented with keratitis caused by various microbiologic agents and relates to its predisposing factors.*

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I. Introduction

Keratitis is an inflammation of the layers of the cornea. It is most commonly associated with bacterial or fungal microorganisms that invade into the corneal stroma, resulting in inflammation and ultimately, destruction of these structures. Keratitis is a serious ocular infectious disease that can lead to severe visual disability. The severity of the corneal infection usually depends on the underlying condition of the cornea and the pathogenicity of the infecting bacteria. Diabetic patients may present with complications involving all systems of the body. Causal agents responsible for keratitis can be dermatophytes, yeasts, and moulds, Bacteria; the agents most frequently isolated from corneal ulcers are dermatophytes and gram-positive bacteria in both diabetic and non-diabetic patients. Factors that determine the treatment outcome depends on patient's age, the type of infecting organism, the treatment regime, and type and degree of corneal involvement. Recurrence may be related to the patient's family history, occupation, lifestyle, underlying physiology or immunosuppression. Some of the suspected cases of contact lens related bacterial keratitis may actually include contact lens related sterile inflammatory infiltrates that resolve spontaneously upon discontinuation of contact lens wear, rather than true cases of bacterial keratitis. Ocular trauma is a major predisposing factor for fungal keratitis and most cases are reported from developing countries such as India. Fungal keratitis is historically associated with trauma with vegetative matter or objects contaminated with soil in both developed and developing countries.

II. Aim

The objectives are to show the following,

- 1.Keratitis in diabetic patients is most commonly caused by either bacteria or fungus.
- 2.To identify various predisposing factors in diabetic keratitis.
- 3.Ocular trauma is an important predisposing factor.
- 4.Fungal keratitis is more severe than bacterial cause.

Inclusion criteria:

All the diabetic patients with corneal ulcers with informed consent to include in our study.

Exclusion criteria:

- 1.Patients with corneal ulcers who are non-diabetic.
- 2.Patients who have started treatment for keratitis with antimicrobial drugs.

III. Materials And Methods

A study was done to determine keratitis incidence in diabetic patients. A questionnaire, specifically designed for this work, was applied to 100 patients of both sexes attended in ophthalmology department of GMKMC, Salem, Tamilnadu. The independent variables were: contact lens wearers, ocular surface diseases , trauma , surgery.

All suspected infectious corneal infiltrates and ulcers were scraped for microbial culture. A corneal smear was taken after topical anaesthesia. Inoculation of agar culture plates (chocolate polyvitex agar, Maconkey agar) was performed with cotton swab applicators. The chocolate polyvitex agar was incubated in an atmosphere containing 3% carbon dioxide, and all media were incubated at 37°C, excepted Sabouraud medium, which was incubated the first night at 37°C and then at 30°C. Gram staining, biochemical tests. A single colony of a virulent organism or at least three colonies of an organism that usually is not considered to be highly pathogenic on the ocular surface (such as coagulase negative staphylococcus) were considered to be positive cultures.

Two slides were done for the direct microscopic examination with spatula. Direct examination was done clarifying the sample with 30–40% KOH or 10–20% NaOH; a drop of the clarifying mixture was added to the sample and, it was let stand for 30 min and then observed with microscope. Samples that showed yeasts or yeast-like organisms were placed in solid media: Sabouraud media with 0.05% chloramphenicol, and incubated at 30°C from 14 to 28 days. To identify yeasts, isolates from Sabouraud media were cultured in ChromAgar™ media and were done with commercial System API 20C AUX (Biomérieux).

IV. Results And Discussion

In 100 cases 68 were identified as bacteria and 32 were identified as fungus by culture. Gram positive bacteria were predominant (83% of all positive cultures), mainly *Staphylococcus aureus* followed by coagulase negative *Staphylococcus* species; Gram negative bacteria (17%) were mostly *Pseudomonas* and *Serratia* species. Twenty-eight per cent of culture positive isolates were detected on smears.

Ocular surface diseases were present in 14 cases and acute corneal trauma (abrasion, laceration, penetration) in 25 cases. In this group, the delay between the onset of the symptoms and the first examination was 7 days. No risk factors were identified in 5 of cases and contact lens wearers were 33 cases and post-surgical were 22 cases. There was no significant correlation between systemic risk factors and severity of clinical presentation.

Figure no.1: Distribution cases based on its origin.

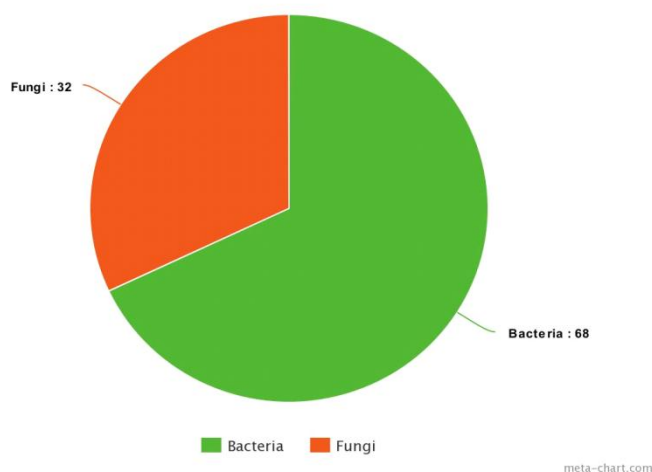
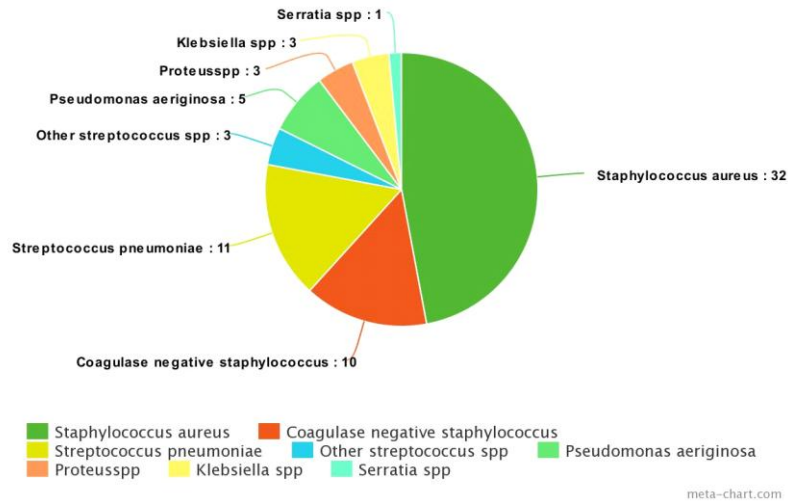


Table no.1: Number of cases caused by bacteria.

Bacteria	Contact lens wearer	Ocular surface disease	Trauma	Surgery	No risk factor	total
<i>Staphylococcus aureus</i>	11	6	9	6	0	32
Coagulase negative staphylococcus	5	2	1	1	1	10
<i>Streptococcus pneumoniae</i>	6	1	1	2	1	11
Other streptococcus spp.	1	0	1	1	0	3
<i>Pseudomonas aeruginosa</i>	1	2	0	2	0	5
<i>Proteus</i> spp.	1	0	1	1	0	3
<i>Klebsiella</i> spp.	1	0	0	1	1	3

Serratia spp.	0	0	1	0	0	1
Total	26	11	14	14	3	68

Figure no.2: Distribution of cases caused by fungus.

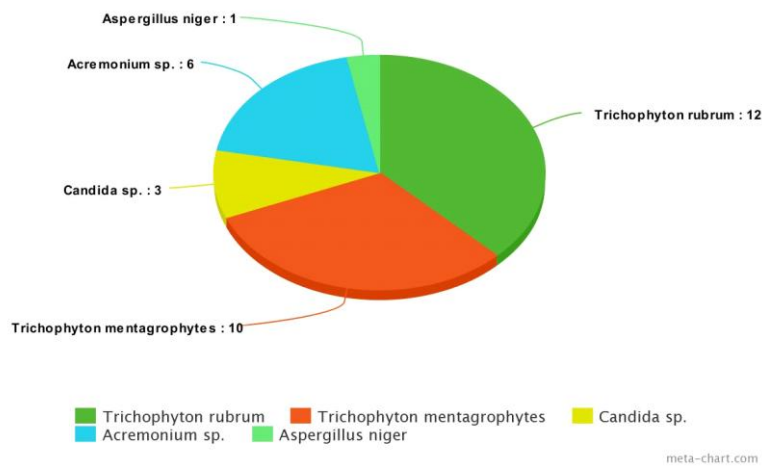


In CL wearers group, 26 of the corneal scrapings were positive. Thirty percent of isolated bacteria were Gram negative, mostly *Pseudomonas aeruginosa*. Contact lens and/or storage cases cultures were performed in 68 cases. The bacteria isolated were similar to the organism recovered by corneal scraping in 14 cases.

Table no.2: Number of cases caused by fungus.

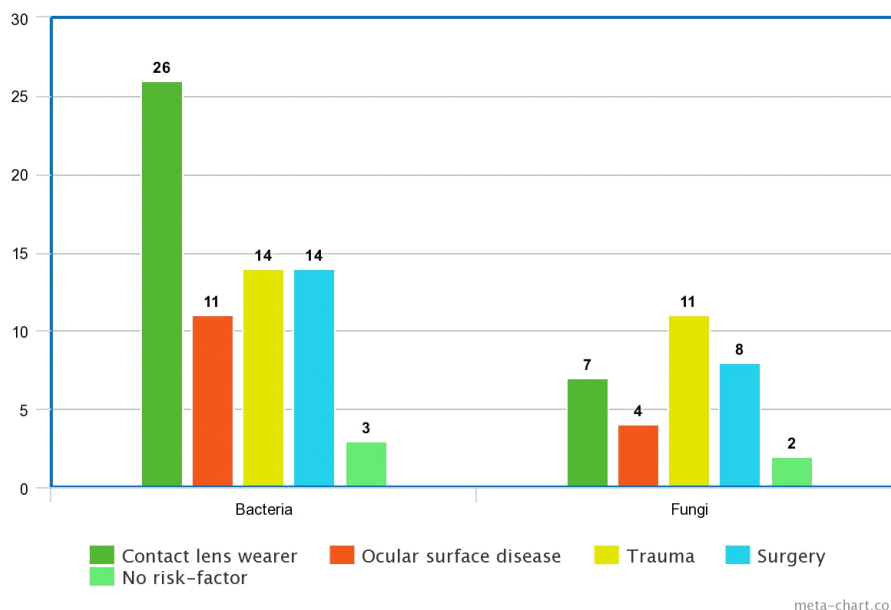
Fungi	Contact lens wearers	Ocular surface disease	Trauma	Surgery	No risk-factor	Total
Trichophyton rubrum	3	2	4	2	1	12
Trichophyton mentagrophytes	2	2	2	4	0	10
Candida sp.	1	0	2	0	0	3
Acremonium species	1	0	2	2	1	6
Aspergillus niger	0	0	1	0	0	1
Total	7	4	11	8	2	32

Figure no.3: Distribution of cases caused by fungus.



As shown fungal keratitis is mostly caused by Trichophyton species followed by Candida species and various other species of Acremonium and Aspergillus niger. The total number of cases caused by fungus is 32. Majority of cases is by trauma followed by surgery, contact lens wearers and ocular surface disease.

Figure no.4: Distribution of cases based on types of predisposing factors in relation with its causative agents



V. Conclusion

Our results emphasise the importance of staphylococci as the major cause of corneal infection, and the need to increase public education about proper contact lens use. Although not a completely true representation of the population, our study does provide an insight into the spectrum of microbial keratitis. Contact lens wearers is now the major predisposing factor for corneal infection. Diabetic patients tend to be more susceptible for keratitis rather than normal non-diabetic individuals. Thus, keratitis occurs commonly in diabetic patients and is alleviated by various predisposing factors. It is shown that fungal keratitis caused by dermatophytes are far more severe than bacterial.

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