

## Frequency of Causative Factors and Microbial Etiology of the Keratitis

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### ABSTRACT

**Objective:** To determine the frequency of the causative factors and most common organisms of keratitis.

**Materials and methods:** This descriptive cross-sectional study was conducted at the Ophthalmology department of Indus Medical College Tando Muhammad Khan. The study included both male and female patients diagnosed with microbial keratitis between the ages of 17 and 60 years. Slit lamp bio microscopy of the anterior segment was performed on all patients, and the corneal epithelial defect was quantified in millimeters using the slit lamp. Corneal scrapings were collected from the base of ulcer using a bent tip 26-gauge hypodermic needle under topical anaesthetic (Alcain), and the sample was immediately studied under an electron microscope, confirming the diagnosis of bacterial keratitis. Patients were then hospitalized, and at the conclusion of therapy, their healing was examined. The research proforma was used to gather all the data, and SPSS version 26 was applied for data analysis.

**Results:** A total of 70 cases diagnosed with microbial keratitis were studied with an average age was 38.22±7.81 years and males were in majority 65.7%. A majority of the patients 55.7% were poor socioeconomically, followed by 32.9% had middle socioeconomic status and only 11.4% were rich socioeconomically. Contact lens and trauma were commonest factors as 28.6% and 24.3% respectively, followed by a history of steroid 11.4%, past ocular previous surgery 11.4%, ocular surface illness 14.3% cases, and others 10.0%. Bacterial and fungus keratitis were commonest 55.7% and 27.1% respectively, followed by 12.9% viral keratitis, mixed microbial keratitis was 2.9% and only one case had Acanthamoeba keratitis.

**Conclusion:** This study concludes that rural areas' poor young males were highly affected by the microbial keratitis. Trauma and unhygienic lens wear were observed to be the prevalent causative factors, with highly prevalent bacterial and fungal microbial etiology.

**Keywords:** factors, prevalence, microbes, keratitis

### INTRODUCTION

Blindness because of corneal opacity is a serious public health issue across the world, with infectious keratitis accounting for the preponderance of occurrences.<sup>1</sup> Although corneal bacterial infections are uncommon in the industrialized world, they account for a large proportion of ocular illnesses in the undeveloped nations.<sup>1,2</sup> Overnight and prolonged days of usage, poor hand hygiene, lens, and storage case cleanliness, youth, male sex and smoking are all known risk factors of the microbial keratitis with all daily wear lenses.<sup>3-5</sup> Features of daily disposable contact lens consumers may result in a distinct risk profile for daily disposable contact lens wear than for other lens wearing techniques.<sup>3</sup> The accessibility of daily disposable lenses, the higher expense, and a predisposition for practitioners to prescription daily disposable lenses as problem-solving lenses may all impact the population utilizing these contact lenses.<sup>3</sup> Considering the most current features of infectious keratitis, such as the predisposing factor and microbiologic profile, is critical in the management of the illness.<sup>6</sup> Although bacterial infections of the cornea are uncommon in the industrialized world, they account for a significant share of ocular illnesses in the developing world. Most people with infectious keratitis in impoverished nations do not obtain medical treatment because they underestimate the severity of their ailment or because they are poor. Furthermore, poor results are caused by a lack of effective pharmaceuticals, critical checking and operational equipment's, and well-trained medical care professionals, as well as lack of fundamental medical insurance systems and a scarcity of corneal transplants.<sup>7</sup> The disease's clinical symptoms vary with age, location, socioeconomic position, and overall health, and they can also alter with time.<sup>6</sup> Corneal opacity is the second leading cause of blindness in Pakistan, behind cataracts. Microbial keratitis could be affected by a wide range of species, including fungi, bacteria, parasites and the viruses, to name a few.<sup>8</sup> The pathophysiology and epidemiology of microbial keratitis vary greatly from place to place<sup>9</sup> and over time, which is why it is critical to obtain local data so that the scope of the disease can be assessed and preventative and therapeutic strategies may be

devised.<sup>8</sup> Infectious keratitis is a potentially fatal condition that can cause significant vision loss.<sup>6,10</sup> Early detection of pathogenic organisms and fast treatment of appropriate antibiotics are critical for preventing irreversible eyesight loss. Understanding the most prevalent features of infectious keratitis, such as the predisposing factors and microbiologic profile, is critical in the management of the illness.<sup>6</sup> The prevalence of corneal ulcers, risk factors, microbes, and antibiotics that are sensitive to them differ from place to region and throughout time.<sup>10</sup> As a result, information updates are critical, especially for a tertiary eye care facility that handles a large number of infective corneal ulcers.<sup>11</sup> However, this study was aimed to determine the frequency of the causative factors and the most prevalent keratitis organisms.

### MATERIAL AND METHODS

This study was a descriptive cross-sectional study conducted at the Ophthalmology department of Indus Medical College Tando Muhammad Khan from September to February 2021. After using a non-probability convenient sampling strategy, a total of 60 patients were enrolled in the research. The study included both male and female patients diagnosed with bacterial keratitis between the ages of 17 to 60 years. All individuals under the age of 16 have been omitted from the analysis, as were those with Mooren's ulcers, ulcers related with exposure, autoimmune and systemic disorders, individuals having Endophthalmitis, and those having Panophthalmitis causing keratitis. The participants' or their caregivers' verbal informed permission was obtained after a thorough medical history and clinical evaluation. Past ocular surface disease history, trauma, usage of topical steroid, contact lens use, and any previous ocular surgery were all documented in detail. Slit lamp bio microscopy of the anterior segment was performed on all patients, and the corneal epithelial defect was quantified in millimeters using the slit lamp. All the cases underwent corneal swabs or scrapings, which were collected and prepared on different slides for microscopic examination of fungi, Bacteria and Acanthamoeba, whereas viral keratitis was confirmed clinically. Patients having serious condition were for the

management and were discharged on stable condition. The research proforma was used to gather all of the data, and SPSS version 26 was applied to analyze it.

## RESULTS

A total of 70 cases diagnosed with microbial keratitis were studied with average age was 38.22+7.81 years and males were in majority 46(65.7%), while females were 24(34.3%).

Most of the cases 51 (72.9%) were rural areas and 19 (27.1%) were from urban areas. Majority of the patients 39 (55.7%) were poor socioeconomically, followed by 23 (32.9%) had middle socioeconomic status and only 08 (11.4%) were rich socioeconomically. Table.1

According to the causative factors, contact lens and trauma were commonest factors as 20 (28.6%) and 17 (24.3%) respectively, followed by history of steroids in 8(11.4%), past ocular previous surgery in 8 (11.4%) cases, ocular surface illness was in 10 (14.3%) cases and among 07 (10.0%) cases were other factors. As per microbial etiology, bacterial and fungus keratitis were commonest among 39 (55.7%) and 19 (27.1%) cases, respectively, followed by 9 (12.9%) cases had viral keratitis was, mixed microbial keratitis (bacterial and fungus) were in 2 (2.9%) cases and only one case had Acanthamoeba keratitis. Table.2

Table 1: Descriptive statistics of the demographic characteristics n=70

Variables	Statistics	
Age (year)	38.22+7.81 years	
Gender	Males	46(65.7%)
	Females	24(34.3%)
Residence	Rural	51(72.9%)
	Urban	19(27.1%)
Socioeconomic status	Poor	39(55.7%)
	Middle	23(32.9%)
	Upper	08(11.4%)

Table 2: Patients distribution according to causative factors and microbial etiology n=70

Variables	Statistics	
Causative factors	Trauma	17(24.3%)
	Contact lens	20(28.6%)
	Use of steroids	8(11.4%)
	Past ocular previous surgery	8(11.4%)
	Ocular surface illness	10(14.3%)
	Others	07(10.0%)
	Total	70(100.0%)
Microbial etiology	Bacterial	39(55.7%)
	Fungus	19(27.1%)
	Viral	9(12.9%)
	Acanthamoeba	01(1.4%)
	Mixed microbial (bacterial and fungus)	2(2.9%)
	Total	70(100.0%)

## DISCUSSION

Infectious keratitis is still a major cause of corneal blindness and vision impairment. Trauma, contact lenses, changes in the ocular surface owing to blepharitis, penetration keratoplasty, or dry eye, and any other systemic illness are the most prevalent risk factors linked with bacterial keratitis globally.<sup>12</sup> Individuals' main complaints include eye discomfort, impaired vision, and photophobia, all of which are significantly dependent on the etiologic agent's aggressiveness. This study was conducted to determine the frequency of the causative factors and most common organisms of keratitis and the average age was 38.22+7.81 years with male gender predominance 65.7%, most of the cases 72.9% were from rural areas and majority of the patients 55.7% were poor socioeconomically. These results were essentially identical to a previous study by Maree GK et al<sup>1</sup> as the patient's average age was 41.26 ± 2.63 years and males were in majority 78.2%, while females were 21.8%. On other hand Narsani AK et al<sup>13</sup> reported that the majority of cases were more than 20 years old with an

average age of 42.6 years and males were in majority 62.1%. The predominance of the males may be because most of the males in our communities engaged in outdoor activities, especially in rural regions where males work in fields (crops/ vegetables), they are at a higher risk of bacterial keratitis attributable to vegetative trauma.

In this study, according to the causative factors, contact lens and trauma were commonest factors as 20 (28.6%) and 17 (24.3%) respectively, followed by a history of steroid was in 8(11.4%), past ocular previous surgery was in 8 (11.4%) cases, ocular surface illness was in 10 (14.3%) cases and among 07 (10.0%) cases were other factors. Consistently in the study of Maree, GK et al<sup>1</sup> reported that the trauma was the most prevalent risk factor, in 7.1 percent of patients experiencing it. The second most frequent risk factor was using contact lens, accounting for 11.8 percent of cases, whereas topical steroids were used by 9.8 percent of cases, ocular surface illnesses by 9.2 percent, and prior corneal surgery by just 1.9 percent of cases. On other hand Lee SJ et al<sup>6</sup> demonstrated that the most prevalent predisposing factor was ocular surface disease discovered in 48(69%) of the cases, particularly as 36 cases had corneal erosion, followed by 3 cases had recurrent corneal erosion, 3 patients had herpes keratitis, graft-versus-host disease was in 2 cases and bullous keratopathy was also in 2 cases, one patient had neurotrophic ulcer and one had a history of chemical burns. Corneal trauma was found 15(21%) of the cases and out of these 14 were males. In their results 7 patients had a history of previous ocular surgery, four patients found with trauma caused by organic material, while five had metallic foreign bodies in their cornea.<sup>6</sup> Fuhrer, they observed in the line of some other studies that the infectious keratitis following corneal trauma is widespread in developing nations and rural regions, although it has become less common as the world has become more urbanization and developed.<sup>6,14,15</sup> It's possible that the large number of individuals with corneal damage is due to the reason that the majority of the individuals in their research were older people who lived in rural regions and worked on farms, putting them at a higher risk of corneal trauma and pathogen exposures.<sup>6,14,15</sup> These findings were in agreement with results of this series.

In this study as per microbial etiology, bacterial keratitis and fungus keratitis were commonest among 39 (55.7%) and 19 (27.1%) cases, respectively, followed by 9 (12.9%) cases had viral keratitis was, mixed microbial keratitis (bacterial and fungus) was in 2 (2.9%) cases and only one case had Acanthamoeba keratitis. Consistently, Shah SI et al<sup>8</sup> reported that after integrating the findings of corneal scrapings and clinically based diagnosis, it is revealed that out of all 56.12% patients had bacterial keratitis, 38.45% cases had fungal keratitis, viral keratitis was in 3.65% of the cases and Acanthamoeba keratitis was observed in 1.78% of the cases. Infectious keratitis caused by numerous bacteria is a rare occurrence, this might happen as a as a secondary infection on top of an infectious disease that already exists or co-infection.<sup>16,17</sup> In a study reported that the ocular trauma may have been the most prevalent cause of keratitis by mixed infection of the fungus and bacteria, and the commonest bacteria and fungi were Staphylococcus epidermidis and Fusarium species. Individuals having keratitis by mixed infection of the fungus and bacteria often have a poor prognosis.<sup>18</sup> Whenever infectious keratitis has an unusual course or does not respond to medical therapy, the potential of a mixed infection with bacterial and fungal species should be addressed.<sup>18</sup> In This study, most of the cases were from rural areas and poor socioeconomically and these findings were similar to the other studies as the infective keratitis was more common in rural regions than in urban zones and the majority of patients chose self-medication over professional medical treatment for budgetary reasons.<sup>7,19</sup> In the study of Stapleton F et al<sup>2</sup> reported that with everyday lens disposal, hand washing is still a crucial hygiene step. Washing hands before touching lenses reduces the around 50% associated risk of moderate to severe microbial keratitis. Wearing contact lenses every day and not washing hands were linked to 90 percent of the illness burden. These risk

variables show that organism inoculation to the ocular surface and extended retention period owing to the presence of the lens are important in the pathogenesis of contact lens-linked microbial keratitis.<sup>2</sup>

## CONCLUSION

This study concludes that rural areas' poor young males are mostly affected by the microbial keratitis. Trauma and unhygienic lens wearing were observed to be the most common causative factors, with highly prevalent bacterial and fungi microbial etiology. Patients should immediately contact their doctors for the treatment without carelessness. Favorable remedies or other basic methods should be advised and advertised by social media for local population before they reach to nearby health facility.

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