

## ORIGINAL ARTICLE

## ETIOLOGICAL DIAGNOSIS OF MICROBIAL KERATITIS IN A TERTIARY CARE HOSPITAL IN GUJARAT

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## ABSTRACT

**Introduction:** Blindness is a major public health problem worldwide, and infectious keratitis is one of the predominant causes. Ulcerative keratitis due to infection with a wide range of organisms such as viruses, bacteria, fungi or protozoa has been reported. Bacterial and mycological keratitis typically occurs in persons having some associated factors.

**Objectives:** To analyze etiology and associated factors associated with microbial keratitis

**Materials and Methods:** The study was conducted at the C. U. Shah Medical College and Hospital, Surendranagar, Gujarat. Total 100 samples from patients with corneal ulcers were studied during the month of December 2010 to October 2011. Swabs and scrapping from the corneal ulcer were collected aseptically. Staining and culture were performed as per standard guidelines. Bacterial and fungal species were isolated as per standard microbiological guidelines.

**Results:** Out of 100 samples, in 14 (14.00%) samples fungal species were isolated and in 13 (13.00%) samples bacteria were isolated. Among 14 fungus isolates, 8 (29.63%) were *Aspergillus flavus* and 6 (22.22%) were *Aspergillus niger*. Among 13 bacterial isolates 7 (25.93%) were *Pseudomonas species*, 3 (11.11%) were *Staphylococcus aureus* and 3 (11.11%) were *Coagulase negative staphylococci*. Common associated factors were injury (44.45%), diabetes mellitus (29.63%), contact lens usage (14.82 %) and corticosteroid treatment (03.70%).

**Conclusions:** Prevalence of mycological keratitis is 14.00% and bacterial keratitis is 13.00%. Common associated factors observed were injury, diabetes mellitus and contact lens usage.

**Key Words:** Prevalence, Microbial keratitis, bacterial, fungal, etiology

## INTRODUCTION

Infectious keratitis is a leading cause of corneal blindness in the developing countries.<sup>1</sup> The incidence of this condition varies from 11 per 100,000 in the United States to 1 - 299 per 100,000 in developing countries. Keratitis blunts the quality of life. Many patients are young, working adults who develop an unexpected infection from contact lenses or other injury.<sup>2</sup> Fungi are the commonest etiological agents and account for around 30-40% of all cases of suppurative keratitis and it varies by geographical area. The factors that have been held responsible for this increasing incidence of fungal keratitis include the widespread use of broad-spectrum antibiotics and steroids, the frequent and prolonged use of contact lenses and post-operative infections.<sup>1</sup> Purulent keratitis is nearly always exogenous due to pyogenic organisms which invade cornea from outside. Organisms which can cause bacterial keratitis are staphylococci, pneumococci, gonococci and

corynebacteriae. Last two can invade normal epithelium.<sup>3</sup> Bacteria account for 13-48 % of all cases of suppurative keratitis and it varies by geographical area. Adequate ocular prevention, identification of the pathogen, initiation of immediate therapy, modification based on the organism identified and consideration of drug toxicity and bacterial resistances represent the keys to success in the management of microbial keratitis.<sup>4</sup> Present study is an attempt to identify the prevalence of microbial keratitis (Bacterial and Mycological) and find out associated factors which may be involved in development of keratitis.

## MATERIALS AND METHODS

The present study was conducted at the Department of Microbiology, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat from December 2010 to July 2011. The study was approved by Institutional Ethical

Committee (Human Research). A total 100 patients having corneal ulcer were evaluated.

**Sample collection and Processing**

Swabs and scrapping of corneal ulcer were taken aseptically and were sent to microbiology laboratory immediately. KOH mount and Gram stain were performed. All specimens were inoculated on Blood agar, MacConkey agar and Sabouraud dextrose agar. Isolation and identification of bacterial and fungal spp. were done as per standard guidelines.<sup>5,6</sup>

**RESULTS**

Among 100 patients of corneal ulcer 61 were male and 39 were female. Out of 100 patients 48 were more than 50 years old, 33 were between 26 to 50 years old and 19 were below 25 Years old **Table 1**. In all age group males were predominant. Out of 100 samples 27 showed growth, which included 14 fungi and 13 bacterial isolates. The most common fungi isolated were *A. flavus* 8 (29.63%) followed by *A. niger* 6 (22.22%). And most common bacterial isolates were *Pseudomonas* sp. 7 (25.93%), followed by *S. aureus* 3 (11.11%) and CONS 3 (11.11%) **Table 2**. No sample showed mixed growth (i.e. Bacterial and Fungal). Associated factors for microbial keratitis were injury 12 (44.45%), followed by diabetes mellitus 8 (29.63%), contact lens usage 4(14.82%) and corticosteroid therapy 1 (03.70%). In 07.40% cases associated factor could not identified **Table 3**.

**Table 1: Age and Gender wise distribution of patients with corneal ulcer**

Gender	Age		
	1-25 Years	26-50 Years	> 50 Years
Male	12	25	24
Female	7	8	24

**Table 2: Etiological Distribution of Microbial Keratitis**

Organism	Number (%)
<i>A. flavus</i>	8 (29.63)
<i>Pseudomonas</i> sp.	7 (25.93)
<i>A. niger</i>	6 (22.22)
<i>S. aureus</i>	3 (11.11)
CONS*	3 (11.11)
Total	27 (100.00)

**Table 4: Prevalence rate of Microbial keratitis in various studies**

Study	Microbial keratitis	Bacterial keratitis	Mycotic keratitis	Others
M. Jayahar Bharathi et al, 2007, South india <sup>7</sup>	70.50 %	34.98 %	32.26 %	02.34%
Ashok Kumar Narsari et al, 2009, Hyderabad <sup>8</sup>	71.00 %	48.80 %	26.36 %	04.25 %
Sadia Sethi et al , 2010, Peshavar <sup>9</sup>	22.00 %	13.00 %	09.00 %	00.00 %
Renato M P et al, 2010, Sau Paulo Brazil <sup>10</sup>	53.50 %	47.10 %	06.10 %	00.40 %
<b>Present study</b>	<b>27.00 %</b>	<b>13.00 %</b>	<b>14.00 %</b>	<b>00.00 %</b>

**\*Coagulase Negative Staphylococci**

**Table 3: Associated Factors for Microbial Keratitis**

Associated Factors	Number (%)
Injury	12 (44.45)
Diabetes Mellitus	8 (29.63)
Contact Lens	4 (14.82)
Corticosteroid Rx	1 (3.70)
Unknown	2 (7.40)

**DISCUSSION**

The prevalence of microbial keratitis was 27%, among these 13% were bacterial and 14% were fungal origin. Similar results are found by Sadia Sethi et al<sup>9</sup> with 13.00% Bacterial and 09.00% fungal origin. M. Jayaram Bharati et al, Ashok Kumar Narsari et al and Renato Megalhaes Passos et al have found higher percentage of microbial keratitis.<sup>7,8,10</sup> Prevalence of microbial keratitis varies from 22-71%. This can be explained as the prevalence of microbial keratitis varies by geographical area and also different seasons can also affect its prevalence **Table 4**. In our study males outnumbered females as cases of keratitis can be explained as males are engage more in outdoor activities. Bakshi et al<sup>1</sup> and Saha R et al<sup>11</sup> have more number of males compared to females as cases of keratitis, while Yousuf NA et al<sup>2</sup> have found females more compared to males as cases of keratitis. In our study males outnumber females as cases of keratitis this can be explained as males are engage more in outdoor activities. Most common fungal isolate isolated was *A. flavus* (29.63%) followed by *A. niger* (22.22%). Most common bacterial isolates were *Pseudomonas* sp. (25.93%) followed by *S. aureus* (11.11%) and CONS (11.11%). Yusuf NA et al<sup>2</sup> and Bharati MJ et al<sup>7</sup> also have reported *Pseudomonas* sp. as most common bacterial isolate. While Schafer et al have reported CONS (40%) as most common bacterial isolate followed by *S. aureus* (22%). Among fungi Saha R et al<sup>11</sup> have reported *A. flavus* as most common fungal isolate **Table 5**. Most common associated factors were trauma (44.45%) followed by Diabetes mellitus (29.63%), contact lens (14.82%) and steroid (3.70%). Bakshi R et al<sup>1</sup> have reported ocular trauma (45.90%) as most common associated factor. While Yusuf NA et al<sup>2</sup> and Schafer et al<sup>4</sup> have reported contact lens usage as most common associated factor. This can be explained as in our study numbers of patients with contact lens are very few **Table 6**.

**Table 5: Etiology Wise Distribution of Isolates**

Author	A. flavus	A. niger	A. fumigatus	Pseudomonas sp.	S. aureus	CONS*
Bharati MJ et al <sup>7</sup>	24.37%	-	-	23.30%	2.45%	18.39%
Bakshi R et al <sup>1</sup>	43.10%#	-	-	-	-	-
Yousuf NA et al <sup>2</sup>	-	-	-	54.00%	10.00%	-
Schaefer F et al <sup>4</sup>	-	-	-	09.00%	22.00%	40.00%
Saha R et al <sup>11</sup>	31.16%	-	16.88%	-	-	-
Present study	29.63%	22.22%	-	25.93%	11.11%	11.11%

\*Coagulase Negative Staphylococci ; #Species were not differentiated

**Table 6: Comparison of Associated Factors**

Author	Ocular Trauma	Diabetes mellitus	Contact lens	Steroid	Abnormal eye
Bakshi R et al <sup>1</sup>	45.90%	14.7%	-	16.80%	16.03%
Yousuf NA et al <sup>2</sup>	08.00%	02.81%	40.00%	-	08.00%
Schaefer F et al <sup>4</sup>	20.00%	-	36.00%	-	-
Present study	44.45%	29.63%	14.82%	03.70%	-

## CONCLUSION

Prevalence of Bacterial Keratitis is 13% and Mycotic Keratitis is 14%. Most common organism isolated were A. flavus (29.63%) followed by Pseudomonas sp. (25.93%), A. niger (22.22%), S. aureus (11.11%) and Coagulase negative staphylococci (11.11%). Associated factors for of microbial keratitis were injury (44.45%), diabetes mellitus (29.63%), contact lens usage (14.82%) and corticosteroid therapy (03.70%).

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