

## Bacterial Keratitis In And Around Visakhapatnam

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**Abstract** : Introduction: Microbial keratitis is a common potentially vision threatening ocular infection caused by bacteria, fungi, viruses or parasites. Bacterial corneal ulceration is an ocular emergency. Hence an understanding of epidemiological features is important in rapid recognition, timely institution of therapy and optimal management. Objectives: To isolate the specific bacterial pathogens and to determine their antibiotic susceptibility pattern. To determine the risk factors and other epidemiological characteristics of infectious keratitis, and the importance of direct microscopy. Methods: Corneal scrapings were collected under strict aseptic conditions from each patient. The scrapings were subjected to direct microscopy (Gram's stain), culture, and identification by standard microbiological techniques, and antibiotic sensitivity testing was performed by Kirby-Bauer disc diffusion technique. Results & Conclusions: Bacterial isolates were obtained from 41 out of 100 samples. Gram positive isolates accounted for 56.09% of the isolates, and Gram negative isolates 43.90%. *Pseudomonas aeruginosa* was the predominant bacterial isolate (26.82%), followed by *Streptococcus pneumoniae* (19.51%). Corneal ulcers showed a higher prevalence in the 21-50yr age group (58.53%), with agricultural labourers contributing to 51.21%. Peak incidence of corneal ulceration was seen during the monsoon season (June – September). History of trauma to the eye, with vegetative matter, was the most frequent predisposing factor noted, representing to 65.85% of the cases. Both Gram negative and Gram positive isolates were more commonly sensitive to amikacin and gentamicin. Both smear & culture positivity was noted in 35 out of 41 samples by Gram's stain giving a sensitivity of 85.36%. [M Anuradha et al NJIRM 2013; 4(4) : 38-41]

**Key Words**: Bacterial keratitis, antibiotic sensitivity, epidemiological features.

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**Introduction**: Microbial keratitis is a common potentially vision threatening ocular infection that may be caused by bacteria, fungi, viruses or parasites. Bacterial keratitis rarely occurs in the normal eye because of human cornea's natural resistance to infection. However predisposing factors such as corneal injury, contact lens wear, ocular adnexal dysfunction (including tear deficiencies), corneal abnormalities and other exogenous factors, systemic diseases, and immuno-suppression may alter the defense mechanisms of the outer eye and permit bacteria to invade the cornea<sup>1</sup>. The majority of bacteria cultured from infections of cornea are of the same species that normally are present in the conjunctival sac, on the lids or periocular skin, and in the adjacent nasal passages. An understanding of epidemiological features is important in rapid recognition, timely institution of therapy and optimal management.

**Material and Methods**: The present study included 100 patients with corneal ulceration

attending to the Out Patient Department at Government Regional Eye Hospital, Visakhapatnam over a two year period. Permission from Institutional Ethics Committee was obtained. All patients with corneal ulcer underwent slit lamp bio-microscopic examination by an ophthalmologist. The following details from the patients in the form of a proforma were taken and followed : name, age and sex, residence, occupation, literacy status, history of corneal trauma and the type of traumatic agent, duration of the ulcer, associated ocular and systemic conditions, history of prior antibiotic or steroid usage. Corneal scrapings were collected under strict aseptic conditions under slit lamp magnification after instillation of 4% lignocaine drops into the eye. Using a sterile Bard – Parker blade (No.15), the material was scraped from the leading edge and base of the ulcer. The scrapings were processed by Gram's stain for direct microscopy, and cultured on to Blood agar, Chocolate agar and Mac Conkey agar. The inoculated plates were incubated at 37<sup>0</sup>C over

night. The isolates were identified by using standard microbiological techniques<sup>2</sup>. Antibiotic sensitivity testing was done for all isolates on Mueller – Hinton agar by the Kirby – Bauer disc diffusion technique. Blood agar was used for fastidious organisms. The following antibiotic discs were used for testing, bearing concentrations: Amoxicillin (Amx)-10 µg, Ampicillin (Amp) -30 µg, Cloxacillin (Cx) -10 µg, Erythromycin (E) -10 µg, Amikacin (Ak)- 30 µg, Gentamycin (G)-30 µg, Ciprofloxacin (Cf) -30 µg , Ofloxacin (Of) -5 µg, Polymyxin B (Pb) - 300 U, Cephalixin (Cp) -30 µg.

**Results:** Corneal ulcers showed a higher prevalence in the economically active age group (21-50 yr), representing 58.53% of the isolates. Male preponderance was shown- 56.09%, and 43.09% in females. 87.80% of ulcers occurred among low socio economic group (income <Rs.11500/ annum), while 12.19% of the ulcers occurred in the middle income group (between Rs.11500 and Rs.80000/ annum).

**Table:1 Bacterial isolates from corneal ulcers (n=41)**

Isolates	No.	%
<i>Pseudomonas aeruginosa</i>	11	26.82
<i>Streptococcus pneumoniae</i>	8	19.51
<i>Staphylococcus aureus</i>	5	12.19
<i>Staphylococcus epidermidis</i>	4	9.75
<i>Burkholderia pseudomallei</i>	3	7.31
<i>Corynebacterium spp.</i>	3	7.31
<i>Micrococcus spp.</i>	3	7.31
<i>Haemophilus influenzae</i>	2	4.87
<i>Citrobacter freundii</i>	2	4.87
Total	41	99.94

No corneal ulcers occurred among the higher income group. 63.41% of bacterial ulcers occurred among patients coming from rural areas (villages) and 36.58% from urban areas (towns and cities). Agricultural labourers contributed to 51.21% of the ulcers, which was followed by daily wage labourers (29.25%). Peak incidence of corneal ulceration was seen during the monsoon season, representing a total of 39.02% of the ulcers, which was followed by the harvest season- 36.58%.

History of corneal trauma was the most frequent predisposing factor noted, representing 65.85% of the ulcers, which was followed by systemic diseases (17.05%). History of injury with vegetative matter was the most frequent traumatic agent noted- 51.85%, which was followed by soil / sand / stone – 18.51%.

*Pseu. aeruginosa* were sensitive to Ak- 90.9%, G- 81.81%, Of- 54.54% , Cf- 81.81% . *Burkholderia pseudomallei* were sensitive to Ak- 100%, G- 100%, Of- 100%, Cf- 66.66% and Cp- 33.33%. *Haemophilus influenzae* were sensitive to Amp- 100%, Ak- 100%, G- 100%. *Citrobacter freundii* were sensitive to Ak- 100%, G- 100%, Of- 100%, Cf- 100% and Cp- 50%. *Streptococcus pneumoniae* were 100% sensitive to Amp, Amx, Cx, Ak & G. *Staphylococcus aureus* were sensitive to Amp- 20%, E- 20%, Cx- 20%, totally resistant to Amx, Ak- 100%, G- 80%. *Staphylococcus epidermidis* were sensitive to Amp & Cp- 50%, Amx & E- 25%, Cx- 75% and Ak and G- 100%. Both smear & culture positivity was noted in 35 out of 41 samples, giving a sensitivity of 85.36% for Gram's stain.

**Discussion:** Bacterial isolates were obtained in 41% of the cases in the present study. This coincides with Bharathi et al<sup>3</sup> – 32.77% and Mohapatra et al<sup>4</sup> – 49.05% . Zhang et al<sup>5</sup> reported a lower incidence of 18% and Gita et al<sup>6</sup> – 27%.

The most common age group affected was 21 – 50 yr - 58.53% . The higher incidence in the middle age group may be explained by the fact that they are more involved in outdoor activities and hence having a greater chance of injury & exposure to infections. Male preponderance was also shown in the present study –56.09% . This coincides with Bharathi et al<sup>3</sup> from S. India who reported 56.76% of in males. Corneal ulcers were common in the lower socio-economic group : 87.80%. These observations could be because of poor nutritional status and unhygienic living conditions of people in lower socio-economic group, and also lack of awareness of importance of early diagnosis and treatment. Corneal ulcers were more common in the rural areas- 63.41%. Bharathi et al<sup>3</sup> from S. India had reported an incidence of bacterial ulcers

in the rural population as 54.07%. Ulcers were more common in agricultural labourers- 51.21%, while 29.26% of bacterial isolates were from other daily wage labourers. Bharathi et al<sup>3</sup> from S. India reported 42.38% of bacterial isolates from agricultural labourers and 57.62% from daily wage labourers. Ulcers were more common in the monsoon season from July to September in the present study – 39.02%. This may be due to the cool, humid atmosphere, offering ideal climate for growth of microbes. The next common incidence was seen during harvesting season (January to March) – 36.58. This could be due to the increased

chances of injury during harvesting season. Bharathi et al<sup>3</sup> from S. India had reported a high incidence of bacterial ulcers during the harvesting season. Other similar reported incidences include Upadhyay et al<sup>7</sup> from Nepal – Monsoon season; Gopinathan et al<sup>8</sup> – Monsoon & Autumn and and Kumari et al<sup>9</sup> from Patna – Monsoon. Sensitivity of Gram's stain in detecting bacterial isolates was found to be 85.36% in the present study. This coincides with Williams et al<sup>10</sup> – 83%, while Sharma et al<sup>11</sup> reported a low sensitivity of 40.9%.

**TABLE:2 Comparison of bacterial isolates**

Author	Ps.aeru. %	Strep. pneumo %	Staph. aureus %	Staph. epider. %	Bur pseudo %	Coryne spp. %	Micro spp %	Hae. influ %	Citro. fruen. %
Alexander et al	25.7	-	19.4	-	-	-	-	-	-
Schaefer et al	-	8	22	40	-	1	-	1	-
Zhang et al	6.2	-	21.71	27.5	-	-	-	-	-
Bharathi et al	18.03	37.5	3.87	17.4	-	2.52	0.54	0.54	0.18
Gita et al	6	11	20	-	-	-	-	-	-
Present study	26.82	19.51	12.19	9.75	7.31	7.31	7.31	4.87	4.87

**Conclusion:** *Pseudomonas aeruginosa* was the predominant bacterial isolate in the present study (26.82%), corneal ulcers being more common in the 21-50 yr age group (58.53%); among males 56.09%; in the low socio-economic group- 87.80%. Season-wise distribution showed the ulcers to be more common during the monsoon season– 39.02%, closely followed by the harvest season– 36.58%. Agricultural labourers were more commonly affected in the present study-51.21%, with a history of trauma (65.85%), and with vegetative matter- 51.85% being the most common traumatic agent. Sensitivity of Gram's stain as a direct microscopy tool was found to be 85.36%.

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