

Fungal Keratitis In And Around Visakhapatnam

Mokkapati Anuradha*, Jyothi Padmaja**

* Associate Professor, Department of Microbiology, Apollo Institute of Medical Sciences and Research, Jubilee Hills, Hyderabad,

**Professor & HOD, Department of Microbiology, Andhra Medical College, Visakhapatnam,

Abstract : Introduction: Corneal infection of fungal etiology is very common and represents 30% to 40% of all cases of culture positive infectious keratitis. Hence an understanding of the epidemiological features is important in rapid recognition, timely institution of therapy, optimal management and prevention of this disease entity. Objectives: To isolate the specific fungal agents causing keratitis. To determine the risk factors and other epidemiological characteristics of infectious keratitis. To evaluate the importance of direct microscopy in the isolation of etiological agents and institution of therapy. Material Methods: Corneal scrapings were collected under strict aseptic conditions from each patient. The scrapings were subjected to direct microscopy using 10% Potassium Hydroxide (10% KOH), fungal culture and identification by standard microbiological techniques. Results & Conclusions: Fungal isolates were obtained in 30 out of 100 samples. The predominant fungal isolate was *Fusarium* spp. (30%), followed by *Aspergillus* spp. (26.66%). Corneal ulcers showed a higher prevalence in the later age groups (31-70 yr), representing a total of 89.99% of the fungal isolates. Male preponderance was seen, with 70% of the fungal ulcers occurring in males. 93.33% of the ulcers occurred among the lower socio economic group and 80% in the rural areas (villages). Agricultural labourers contributed to 63.33% of the corneal ulcers, and peak incidence of corneal ulceration was seen during the monsoon season- 43.33%. History of corneal trauma (83.33%), with vegetative matter (68%), was the most common predisposing factor noted. 10% KOH mount was positive in 28 out of 30 fungal ulcers- 93.33% sensitivity. [Mokkapati A et al NJIRM 2013; 4(4) : 16-19]

Key Words: Fungal keratitis, 10% Potassium Hydroxide mount, epidemiological features.

Author for correspondence: Dr M Anuradha, MD, Associate Professor, Department of Microbiology, Apollo Institute of Medical Sciences and Research, Jubilee Hills, Hyderabad- 96. E-mail- radha114@gmail.com

Introduction: Microbial keratitis is a common potentially vision threatening ocular infection that may be caused by bacteria, fungi, viruses or parasites¹. Corneal infection of fungal etiology is very common and represents 30% to 40% of all cases of culture positive infectious keratitis. Fungal keratitis is a major public health problem¹. Filamentous fungi are responsible for a larger proportion of these corneal infections in tropical climates than in temperate climates, particularly following trauma with vegetative matter. The etiological and epidemiological patterns of corneal ulceration have been found to vary with the patient population, health of the cornea, geographic location and climate, and also tends to vary over time². Hence an understanding of the epidemiological features is important in rapid recognition, timely institution of therapy, optimal management and prevention of this disease entity.

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 condition, 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 subjected to direct microscopy with 10% Potassium Hydroxide (KOH), and inoculated on to Sabouraud's Dextrose Agar with antibiotics. The inoculated SDA slopes were incubated in a Biological Oxygen Demand (BOD) incubator at 25°C. An uninoculated SDA slope was exposed by the side of the eye for few minutes & incubated along with inoculated media as control, to determine whether the isolated fungus was a

contaminant or a true intruder. The SDA bottles were examined regularly, and discarded at four weeks if no growth was seen. The fungal isolates were identified^{3,4} after one week of inoculation by looking for gross morphology – whether filamentous or yeast like, when filamentous – by their colony characteristics, any pigmentation on the obverse and reverse. The filamentous fungi were identified by tease mount technique stained with lacto phenol cotton blue (LPCB). Further characterisation of filamentous fungi was done by slide culture technique when required. Yeast like isolates were identified by Gram's staining and further biochemical tests. None of the exposed SDA slopes taken as controls showed any growth for fungi.

Results: Corneal ulcers showed a higher prevalence in the later age groups (31-70 yr)- 89.99%. Male preponderance was shown- 70% in males and 30% in females. 93.33% of the ulcers occurred among low socio economic group (income less than 11500 per annum), while 6.66% occurred in the middle income group (income between 11500 & 80000 per annum). No corneal ulcers occurred among the higher income group. Agricultural labourers contributed to 63.33% of the ulcers, followed by daily wage labourers- 26.66%. Peak incidence of corneal ulceration was seen during the monsoon season (June – September) - 43.33%. This was followed by a high incidence during the harvest season (Jan. to March)- 36.66%. History of corneal trauma was the most frequent predisposing factor- 83.33%, followed by systemic diseases- 6.66%. History of injury with vegetative matter was the most frequent traumatic agent noted- 68%, followed by soil / sand / stone – 16%. Direct smear examination using 10% KOH mount was positive in 28 out of 30 isolates- 93.33% sensitivity.

Table:1 . Fungal isolates from 100 samples

S.No.	Isolates	No.	% (n=30)
1.	Fusarium spp.	9	30
2.	Aspergillus spp.	8	26.66
3.	Cladosporium spp.	2	6.66
4.	Penicillium spp.	2	6.66

5.	Bipolaris spp.	1	3.33
6.	Alternaria spp.	1	3.33
7.	Acremonium spp.	1	3.33
8.	Paecilomyces spp.	1	3.33
9.	Curvularia spp.	1	3.33
10.	Rhodotorula spp.	1	3.33
11.	Unidentified	3	10
	Total	30	99.96

Discussion: Fungal isolates were obtained in 30% of the cases in the present study. This coincides with Zhang et al⁵ – 34.8% and Bharathi et al² – 34.4%. Mohapatra et al⁷ and Gita et al⁶ reported a lower incidence of 18.73% and 8% respectively.

Fusarium spp. were the predominant isolates in the present study – 30%. This coincides with Gopinathan et al¹⁰ – 37.2%, Mohapatra et al¹⁶ – 23% and Bharathi et al³ – 42.82. Aspergillus spp. were the next common isolates in the present study – 26.66%. This coincides with Gopinathan et al¹⁰ – 30.7% and Bharathi et al² – 26%. Yeasts were not isolated in the present study. Most common age group affected was 31-70 yrs- 89.99%. Bharathi et al² from South India reported in 21-50 yr. age group – 66.85%. Kumari et al⁸ from Patna, Gopinathan et al¹ from Hyderabad and Deshpande et al⁹ from Mumbai also reported a higher incidence of fungal corneal ulcers in the 21-50 yr age group. 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 present in the present study- 70%. This coincides with other authors – Gopinathan et al¹ from Hyderabad – 71.15% in males, Bharathi et al² from S. India – 65.08% in males and Jyothi Padmaja et al¹⁰ from Visakhapatnam – 68.51% in males. Corneal ulcers were common in the lower socio-economic group - 93.33%. Joga Lakshmi et al¹¹ from Kurnool reported 90% of the fungal ulcers in the low socio-economic group and Jyothi Padmaja et al¹⁰ from Visakhapatnam – 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- 80%. This coincides with Bharathi et al² from S. India who reported 80.27% incidence among rural population. Jyothi Padmaja et al¹⁰ from Visakhapatnam also reported a high incidence of fungal ulcers in the rural areas. Corneal ulcers occurred among agricultural labourers in 63.33% of the cases in the present study. Other similar reported incidences include : Bharathi et al² from S. India – 64.75%; Deshpande et al⁹ from Mumbai – 88% and Kumari et al⁸ from Patna – 82%. Ulcers were more common in the monsoon season from July to September in the present study – 43.33%. 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) – 36.66%. This could be due to the increased chances of injury during harvesting season. Bharathi et al² from S. India had reported a high incidence of fungal ulcers during the monsoon season. Other similar reported incidences include Upadhyay et al¹² from Nepal – Monsoon season; Gopinathan et al¹ – Monsoon & Autumn and Kumari et al⁸ from Patna – Monsoon. Trauma acted as the most common predisposing factor- 83.33%. The other similarly reported studies include - Kumari et al⁸ – 81.58%; Bharathi et al² – 92.15%; Deshpande et al⁹ – 89.92%. Gopinathan et al¹ and Panda et al¹³ reported a lower incidence of 54.4% and 53.3% respectively. Jyothi Padmaja et al¹⁰ reported a still lower incidence of 14.4% only. Trauma with vegetative matter acted as the most common type of traumatic agent – 68% in the present study.

Bharathi et al² from S. India reported injury with vegetative matter in 92.15% of fungal ulcers. Panda et al¹³ from Patna reported 60.5% incidence of history with vegetative matter predisposing to corneal ulcers. Injury with soil/sand/stone was noticed in 16% in the present study. Bharathi et al² reported in 7.21% of the fungal ulcers. Sensitivity of 10% KOH mount in detecting fungal elements from corneal scrapings was found to be 93.33% in the present study. This coincides with Vajpayee et al¹⁴ – 94.4%; Panda et al¹³ – 90.2%; Sharma et al¹⁵ – 87.7% and Poonam et al¹⁶ – 88%.

Kumari et al⁸ and Bharathi et al² reported a higher sensitivity of 100% and 99.23% respectively.

Conclusion: *Fusarium* spp. were the predominant fungal isolates in the present study (30%), followed by *Aspergillus* spp (26.66%). Age wise incidence showed ulcers to be more common in the middle & elderly age groups of 31-70 yr. (89.99% cases); ulcers were more common in males – 70%; and in the low socio-economic group - 93.33%. Agricultural labourers were more commonly affected – 63.33; and ulcers were more common during the monsoon season- 43.33%. History of trauma was found to be the most common predisposing factor – 83.33%, injury with vegetative matter being the most common type of traumatic agent – 68%. Sensitivity of 10% KOH mount was found to be 93.33%.

Acknowledgement: It is my immense pleasure to record hereby my most respectful regards & deep sense of gratitude to Dr. I. Jyothi Padmaja, M.D., Professor & HOD, Department of Microbiology, Andhra Medical College, Visakhapatnam.

References:

1. Gopinathan U., Garg P., Feruandes M., Sharma S., Athmanathan S., Rao G.V. The epidemiological features and laboratory results of Fungal keratitis : A 10 year review at a referral eye care centre in South India. *Cornea*, Aug. 2002; 21(6): 555-559.
2. Bharathi M.J., Ramakrishna R., Samala Vasu, Meenakshi R., Palani Appan .R. Epidemiological characteristics and laboratory diagnosis of fungal keratitis: A three year study. *Indian Journal of Ophthalmology*, Dec. 2003; 51(4): 315-322.
3. Chester W. Emmons, Chapman H. Binford, John P. Utz. *Mycotic keratitis*. In: *Medical Mycology*, Lea and Febiger Publications, 1970; 436-437.
4. Jagadish Chander. *Oculomycoses*. In: *Text book of Medical Mycology*. Mehta Publications, 2002; 310-319.
5. Zhang W., Pau. Z., Jin-X., Luo.S., Luo.Y., Wu.Y., Li-R. The variance of pathogenic organisms of

- purulent ulcerative keratitis. Zhoghua yan ke Za zhi, Jan. 2002; 38: 8-12.
6. Gita Varaprasthan, Kevin Miller, Thomas Lietman, John W. Whitcher, Vicky Cevallos. Trends in the etiology of infectious corneal ulcers at the F.I. Proctor Foundation. *Cornea*, May 2004; 23(4): 360-364.
 7. Mohapatra .D, Mallick B, Panda P.L., Sarangi G, Chayani N., Panda .B, Patra G.C. XXVII National Conference of Indian Association of Medical Microbiologists souvenir. A study of infective keratitis with special reference to mycotic etiology, Nov. 2003: 85.
 8. Kumari .N, Xess A., Shahi S.K. A study of keratomycosis : Our experience. *Indian Journal of Pathology Microbiology*, July 2002; 45(3): 299-302.
 9. Deshpande S.D., Koppikar G.V. A study of mycotic keratitis in Mumbai. *Indian Journal of Pathology and Microbiology*, Jan. 1999; 42(1): 81-87.
 10. Jyothi Padmaja I, Saroja Venugopal M.A. Study of keratomycosis. *The Indian Practitioner*, 1990; XLIII(1): 19-22.
 11. Jogalakshmi. D., Leela Naidu, P.S. Jayakar P.A. Keratomycosis. *The Indian Practitioner*, 1985; 457-460.
 12. Upadhyay M.P., Rai N.C., Brandt F., Shrestha R.B. Corneal ulcers in Nepal. *Graefes Arch Clinical experimental Ophthalmology*, 1982; 219(2): 55-59.
 13. Panda A., Sharma N., Das G., Kumar N. Sripathy G. Mycotic keratitis in children. Epidemiological and microbiologic evaluation. *Cornea*, May 1997; 16(3): 295-299.
 14. Vajpayee R.B., Angra S.K., Sandramouli .S, Honavar S.G, Chhabra V.K. Laboratory diagnosis of keratomycosis : Comparative evaluation of direct microscopy and culture results. *Annual Ophthalmology*, Feb. 1993; 25(2).
 15. Sharma S., Kunimoto D.Y., Gopinathan U., Rao G.N., Garg. P. Evaluation of corneal scraping smear examination methods in the diagnosis of bacterial and fungal keratitis. *Cornea*, Oct. 2002; 21(7): 643-647.
 16. Poonam S. Loomba, Mehfa D.K., Mishra B., Mandal A. XXVII National Conference of Indian Association of Medical Microbiologists Souvenir. Fungal keratitis in and around Delhi, Nov. 2003: 84.

Conflict of interest: None

Funding: None
