



Original Research Article

Clinical profile and visual morbidity of patients with infectious keratitis in rural area of Pawapuri, Bihar, India: A hospital based prospective study

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Abstract

Objectives: This present study was to evaluate the clinical and investigative profile and visual morbidity of patients of infectious keratitis in rural area of Pawapuri, Bihar, India.

Methods: A total of 100 cases of infectious keratitis with irrespective to age and gender were enrolled in this study. A detail history, clinical examinations and relevant investigation were performed to all patients of infectious keratitis. Best Corrected Visual Acuity (BCVA) was observed. All patients were evaluated on slit lamp to record the size, depth, and location of ulcer along with an examination of margins, floor, and infiltrations.

Results: Data was analyzed by using simple statistical methods with the help of MS-Office software.

Conclusions: Middle age group male populations were commonly suffered with infectious keratitis. Farmers were greatly infected. Most common pathogens of infectious keratitis were fungal in rural area population. *Aspergillus* and *fusarium* are the most common fungal pathogens were isolated. Infectious keratitis patients from rural area were commonly used steroid without the supervision of Ophthalmologist. Among vision threatening patients, perforation were commonly seen. Majorities of cases had gained corneal healing. And least number of cases was deteriorated due to poor follow up and ignorance of treatment. Promotion of protective goggles use while farming/house hold work, prompt medical supervision and early appropriate treatment can help the community to reduce the burden of corneal blindness. Necessary steps should be taken to avoid injudicious of steroids in infectious keratitis.

Keywords: Infectious keratitis, rural area, farmer, BCVA, steroids.

Introduction

Corneal disease remains the leading cause of monocular blindness worldwide, especially affecting marginalized populations.^[1] Corneal

opacities, which are largely caused by infectious keratitis, are the fourth leading cause of blindness globally and are responsible for 10% of avoidable visual impairment in the world's least developed

countries.^[2] Approximately 2 million people develop a corneal ulcer every year in India alone.^[3]

The cornea is an important barrier against dirt, microbes, and other particles that can harm the eye. It also plays a key role in vision. It is the transparent tissue at the front and center of the eye, which permits and refracts light to pass inside, through the pupil, lens, and at the back of the eye onto the retina. The curvature of the cornea plays an important role in focusing the light^[4]. The term "corneal disorder" refers to a variety of conditions that mainly affect the cornea. These include infections, dystrophies, and many other conditions that may arise as a result of heredity. Corneal diseases due to infectious causes need immediate attention because visual disability due to them can be preventable, if treatment started ontime.^[5]

Objectives of our study were to evaluate the various causes, clinical and investigative profile and visual morbidity of patients with infectious keratitis in rural area of Pawapuri, Nalanda, Bihar.

Materials and Methods

This present study was conducted in department of Ophthalmology, VIMS, Pawapuri, Nalanda, Bihar, India during a period from December 2018 to April 2019. A total of 100 patients of infectious keratitis with irrespective of age and gender were enrolled in this study. All the cases were belonged in the rural area of Pawapuri, Nalanda, Bihar.

Inclusion criteria of this study were the patients on the treatment of infectious keratitis with regular follow-up. And the patients showing signs and symptoms of endophthalmitis, panophthalmitis and treatment defaulter were excluded in this study.

Methods

A detail history, clinical examinations and relevant investigations were taken to all cases of infectious keratitis.

Visual acuity was recorded at the time of presentation. For the assessment of visual acuity, cases were classified into Groups A to F, based on

presenting Best Corrected Visual Acuity (BCVA). Group A (6/6 to >6/18), Group B (6/24 to >6/60), Group C (5/60–1/60), Group D counting fingers, Group E hand movement (HM to PL), and Group F no perception of light (No PL). Visual acuity was compared at the time of presentation and after treatment.

Predisposing factors, previous treatment, and duration of symptoms were asked to all cases. All patients were evaluated on slit lamp to record the size, depth, and location of ulcer along with an examination of margins, floor, and infiltrations. Examination of ocular adnexa including lids, eyelashes, and lacrimal sac area was done. The sac syringing was done to check the patency of the lacrimal system, and random blood sugar was recorded to screen for diabetes mellitus in every patient. Corneal scraping was done in cases of large epithelial defect and involved visual axis. A nonpreservative topical anesthetic was instilled (proparacaine 0.5%). Scraping was taken with a disposable scalpel blade. Loose mucus and necrotic tissue were removed before scraping. The margins and base of the lesion were scraped. The thin smear was placed on one or two glass slide for microscopy, including gram stain, Giemsa, acid-fast bacillus, calcofluor white. Samples were plated onto culture media, routinely blood agar, chocolate, and sabouraud media were used and placed incubator. Standard antimicrobial therapy was given based on laboratory reports. Scraping may be delayed without treatment for 12 h if antibiotics have instilled previously. Viral keratitis cases were confirmed on basis of clinical findings, fluorescein and rose Bengal stain. If no improvement after 48 h then suspension of treatment for 24 h, rescraping performed with inoculation on broader range of media and additional staining techniques requested. Corneal biopsy was sent for histology and culture. If patients were no sign of healing after 7–8 days' label as nonhealing ulcer.

Statistical Analysis

Data was analyzed by using simple statistical methods with the help of MS-Office software.

Observations

In this present study, total 120 infectious keratitis patients were come in ophthalmology department of VIMS, Pawapuri. 20 patients were not come for regular follow up. 100 infectious keratitis patients were continued for regular follow up. So that we were enrolled 100 patients of infectious keratitis for this present study.

Table.1. Age wise distribution of cases with infectious keratitis.

Age group	No. of cases	Percentage of cases
5-25	8	8%
26-45	22	22%
46-60	42	42%
61-80	16	16%
Above 80 years	12	12%
Total	100	100%

We were selected total of 100 patients with infectious keratitis with age group 5 years to above 80 years. Majorities of infectious keratitis patients 42(42%) were seen in age group of 46-60 years.

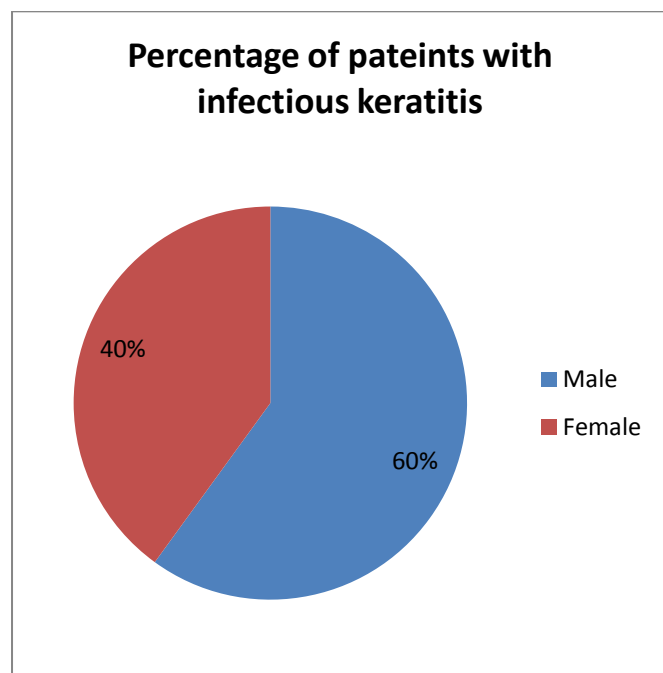


Figure.1. Gender wise distribution of patients with infectious keratitis
Among 100 cases, there were 60% males and 40% females. Male and female ratio was 3:2.

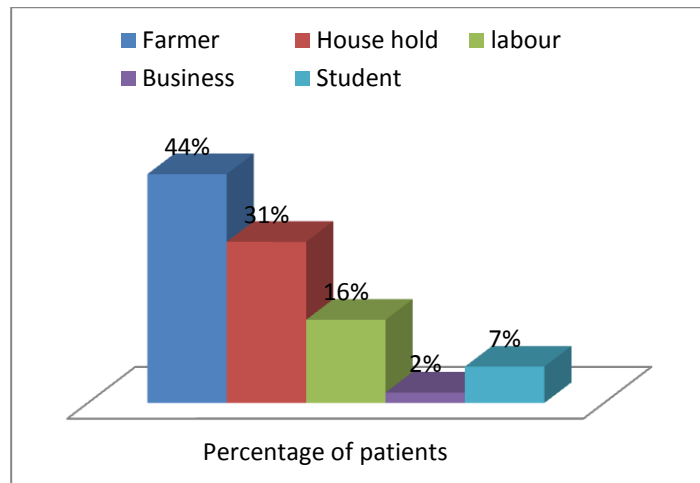


Figure.2. Occupation wise distribution of cases with keratitis.

In this present study, occupation of infectious keratitis patients were 44% farmer, 31% house hold, 16% labour, 2% business and 7% student/Childs.

Table.4 Pathogens in among farmers (out of total 44 cases).

Pathogens	No. of cases	Percentage of cases
Fungal	32	72.73%
Bacterial	8	18.18%
No growth	4	9.09%
Total	44	100%

Among total 44 farmers, majorities of patients (72.73%) were infected by fungal. Less common pathogens was bacteria (18.18%) and others like virus (9.09%).

Table.5. Showing the pathogens of patients with infectious keratitis

Pathogens	No. of cases	Percentage
Fungal	55	55%
Bacterial	24	24%
Viral	16	16%
Mix clinical presentations	5	5%
Total	100	100%

Also among in total cases of infectious keratitis, fungal (55%) was the most common pathogens. Bacteria and others were the less common pathogens of infectious keratitis.

Table.6. Status of patients came in hospital out of 100 cases of keratitis.

Patients	No. of patients	Percentage
Fresh cases	48	48%
Antimicrobial drugs	20	20%
Steroids	32	32%
Total	100	100%

Out of 100 cases of infectious keratitis, majorities of patients (48%) were come in OPD without taking any prior medicine. And (32%) cases were taking steroids before come in OPD. (20%) infectious keratitis patients were priority taken antimicrobial drugs.

Table.7. Duration of infection, patients came in hospital

Duration	No. of cases	Percentage
1 st weeks	34	34%
2 – 3 weeks	44	44%
Above 4 weeks	22	22%
Total	100	100%

Majorities of infectious keratitis (44%) were 2-3 weeks of infection, when they had come in OPD, VIMS, Pawapuri, first time. 34% cases were suffered with infectious keratitis from duration of 1st week. And 22% cases were suffered from duration of above 4 weeks.

Table.8. Cases of infectious keratitis on Grading of BCVA

BCVA	No. of cases	Percentage
Group E	44	44%
Group D	27	27%
Group C	14	14%
Group B	9	9%
Group A	4	4%
No PL	2	2%

Out of total 100 cases of infectious keratitis, grading of best corrected visual acuity (BCVA) of patients were 44% group E, 27% group D, 14% group C, 9% group B, 4% group A and 2% no PL.

Table.9. Complications

Complications	No. of cases	Percentage
Vision threatening	27	27%
Less vision threatening	73	73%
Total	100	100

During the treatment, we were found that majorities of cases were less vision threatening

(73%) and only 27 % cases of infectious keratitis were vision threatening.

Table.10. Complications among total (27) cases of vision threatening.

Complications	No. of cases	Percentage
Perforation	14	51.85%
Secondary glaucoma	4	14.81%
Fibrinous exudates	5	18.51%
Iridiocyclusitis	2	7.41%
Adherent leukoma	2	7.41%
Total	27	100%

Out of total 27 cases of vision threatening, 51.85% (14) cases had perforation followed by 4%(14.81) secondary glaucoma, due to 5(18.51%) fibrinous exudates, 7.41%(2) iridiocyclusitis and adherent leukoma.

Table.11. Prognosis

Prognosis	No. of cases	Percentage
Corneal healing	68	68%
No changes in ulcer status	11	11%
Perforate	10	10%
Progress	4	4%
Improved	34	34%
Stable	53	53%
Deteriorate	6	6%

Out of 100 cases of infectious keratitis, 68% had corneal healing, 53% cases were stable. 34% cases were improved. No changes in ulcer status were found in 11% cases, 10% perforate and 4% progress. And only 6% cases were deteriorated with respect to BCVA due to poor follow up and ignorance of treatment.

Discussions

Infectious keratitis is still one of the main causes of corneal blindness and visual Disability^[6].

In developing countries, most patients with infectious keratitis do not receive medical care due to discounting the seriousness of their condition or poverty. In addition, the lack of effective drugs, essential checking and operating equipment, and well-trained medical care personnel, as well as a lack of basic medical insurance systems and a shortage of cornea grafts, result in severe outcomes.^[7]

In present study, we were enrolled a total of 100 patients of infectious keratitis. Middle age group

(46-60 years) populations ((46%) were commonly suffered. On occupation wise, farmers (44%) were greatly suffered with infectious keratitis followed by house hold (31%), labour (16%) and students/children (7%).

Because of , most of them were a farmer as this is the most common occupation of rural population in developing countries. Agriculture trauma was the leading predisposing factor of corneal ulcer in developing countries.^[8] Similar result was found by Panda et al.^[8] Khare et al^[9].

Srinivasan et al.^[10] showed that the majority of corneal ulcers were observed in the farmer. Vegetative trauma was the most common predisposing factor for the development of corneal ulcer representing 49% cases.

In this present study, infectious keratitis was greatly seen in male population (60%) with respect to female population (40%). Male predominance was found in many studies^[9,11]. This may be because males are more involved in outdoor activities and also males are preferred over females to seek medical advice.

In our present study, among farmer (44), most common causative agent of infectious keratitis was fungus (72.73%). In among total 100 cases of infectious keratitis, fungal infectious keratitis (55%) was commonly seen. Bacterial infectious keratitis (24%), viral (16%) and mix (5%) were found.

Jin Cao, et al reported that the distribution of infectious keratitis subtypes were 17/39 (43.6%) viral keratitis, 18/39 (46.2%) bacterial keratitis, and 4/39 (10.2%) fungal keratitis.^[7]

Fungal keratitis is reported mainly from developing countries of the world, predominantly occurs after ocular trauma. It is mainly caused by filamentous fungi such as *Fusarium* and *Aspergillus* sp, and some yeasts, mainly *Candida*.^[5] *Staphylococcus aureus*, Coagulase-negative *Staphylococcus*, *Pseudomonas aeruginosa*, *Streptococcus pneumoniae*, and *Serratia* sp. are the most common causative agents of bacterial keratitis. Among viruses, Herpes simplex virus (HSV) and among parasites

Acanthamoeba sp. are the most common cause of microbial keratitis^[12,13]. Similar finding was also obtained by Srinivasan et al.^[10]

Fungal ulcers often have worse outcomes than bacterial ulcers, and there is little evidence to guide treatment.^[14] Fungal keratitis represents a relatively small percentage of infectious keratitis cases in regions with temperate climates; however, in tropical climates it can cause up to 50% of infectious ulcers.^[14,10]

In this present study, fresh cases of infectious keratitis without taking any prior medicine were 48%. That was come first time in OPD of department of Ophthalmology, 32% cases were previously taken steroid. And 20% cases of infectious keratitis were taken antimicrobial drugs, who were come in OPD first time.

The use of adjuvant corticosteroids has long been debated in the treatment of bacterial keratitis.^[15,16]

Proponents of the use of corticosteroids argue that they improve outcomes by decreasing inflammation, thereby reducing scarring, neovascularization, and stromal melt.^[16,17] However, others argue that corticosteroids delay epithelial healing and may even worsen infection.^[18]

A recent Cochrane review of adjuvant topical steroids for bacterial keratitis identified 4 randomized controlled trials comparing adjuvant steroids with topical antibiotics alone.^[19] Three small randomized controlled trials examining the benefit of adjuvant topical steroids for the treatment of corneal ulcers found no difference in visual acuity outcomes or healing times between those randomized to topical antibiotic alone and those randomized to topical antibiotic plus topical steroid.^[20]

In this present study, majorities of infectious keratitis patients (44%), who were come first time OPD had duration of infection 2-3 weeks. 34 % cases were suffered from 1st week. 22% infectious keratitis were suffered from duration above 4 weeks.

The spectrum of microorganisms that produce bacterial keratitis is usually most influenced by

contact lens wear or pre-existing disease or injury of the cornea. The most common organisms cultured from bacterial ulcers were *Staphylococcus*, *Streptococcus*, *Pseudomonas*, and *Serratia* species.^[21]

Currently, indigenous bacteria such as coagulase negative staphylococcus are increasingly being isolated in bacterial keratitis and have become the bacterial pathogens most responsible for infectious keratitis. The same finding has been recently observed by Vajpayee in India,^[25] and in the United States.^[22,23]

In this present study, left eye of patients were more affected with infectious keratitis (57%) than right eye (40%). And 2% cases were bilateral infectious keratitis.

T Bourcier, et al supported the finding of our study. They were reported that the Keratitis involved the right eye in 45.7% (137) of cases, and the left eye in 54.3% (163) of cases. Infection was bilateral in nine patients (3%).^[21]

In this present study, when patients were come in OPD first time. Majorities of infectious keratitis patients (44%) had grading of best corrected visual acuity (BCVA) were group E. 27% were group D, 14% were group C, 9% cases were group B. And only 2% cases were no light perception (no PL).

In this present study, vision threatening cases were found 27%. Majorities of cases (73%) had less vision threatening such as corneal scar, corneal opacity, mild iridocyclitis, and mild raised intraocular pressure (IOP) which was controlled on topical anti-glaucoma medication.

Among 27% cases of vision threatening, 51.85% (14) cases had perforation followed by 14.81% (4) secondary glaucoma, due to 5(18.51%) fibrinous exudates, 7.41% (2) iridocyclitis and adherent leukoma.

Ocular trauma was the most prevalent predisposing factor in young patients in the 1980s.^[26] However, recent studies showed a decrease of corneal ulcers following traumas,^[24] which is a far more common predisposing factor

in rural areas or low income countries^[25] were it accounts for up to 77.5% of cases.^[21]

In our present study, after the treatment, we were found that 68% patients of infectious keratitis had gained corneal healing. 34% cases were improved. No changes in ulcer status were found in 11% cases, 10% perforate and 4% progress. And only 6% cases were deteriorated accordance with BCVA due to poor follow up and ignorance of treatment.

Corneal disorders have been described since a long time, but even today, despite the availability of advance diagnostic techniques and a wide range of antimicrobials, it still poses a diagnostic and therapeutic challenge. Infectious keratitis is the major contributing factor in the vision loss in all age group of patients. So, there is a need of knowledge and awareness about these diseases for early detection and prompt administration of correct treatment to prevent sight threatening consequences.

Conclusions

This present study was concluded that the middle age group, male, farmers were commonly suffered with infectious keratitis. Most common pathogens of infectious keratitis were fungal in rural area population. *Aspergillus* and *fusarium* are the most common fungal pathogens were isolated. Left eye was more infected than right eyes. Among vision threatening patients, perforation were common in patient who used steroid without the supervision of Ophthalmologist. Majorities of cases had gained corneal healing. And least number of cases was deteriorated due to poor follow up and ignorance of treatment. Promotion of protective goggles use while farming/house hold work, prompt medical supervision and early appropriate treatment can help the community to reduce the burden of corneal blindness. Necessary steps should be taken to avoid injudicious of steroids in infectious keratitis.

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