SUMMARY & CONCLUSION
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The present study was done on the corneal ulcer cases to find out the incidence of infection in corneal ulcers and to study the bacterial and fungal type of keratitis along with their sensitivity pattern against the commonly used antimicrobial agents.

102 clinically confirmed cases of corneal ulcers and 25 control cases were studied. A detailed history regarding occupation, address, socio-economic status, the present and past history of the ocular and systemic diseases, nature of injury, use of drugs and indigenous materials, present and past drug history was taken with special reference to corticosteroids and antibiotics.

General and local examination of the patient was done. In the eye, site, size, position, shape, presence or absence of hypopyon, nature of the exudate if any was noted. Satellite lesions and corneal vascularization were also studied.

Samples were collected by scraping the corneal ulcer at its periphery to obtain maximum number of viable organisms. Direct microscopy was done by preparing KOH mount and smear examination stained by Gram's and PAS stains.
The inoculum from corneal scrapings were seeded on several media for the study of bacterial and fungal isolation. The organisms if isolated on culture media were studied and sensitivity pattern of the isolates was detected by standard techniques.

Maximum number (48%) of corneal ulcer cases were seen between 41-60 years of age. Males were more commonly affected than females. The male-female ration was 4:1.

78.4 percent of ulcer cases were detected in upper-lower and lower socio-economic classes.

Incidence of corneal ulcer cases was maximum among farmers (57.8%) followed by housewives (20.6%). Student group and washermen had the minimum number of cases.

Out of the 102 ulcer cases, infection was found in 45(44.1%) cases. 18(17.6%) cases were infected by bacterial agents and 27(26.5%) cases had fungal keratitis.

Infection of ulcer in different months of the year was studied. The infection was found throughout the year. However, one peak in bacterial and two peaks in fungal infection were noted, in fungal infection peaks were noted in months of June-July (30.3%) and September-October (36.8%). The peak in bacterial infection
was observed in the months of September and October.

Infection of ulcers was found predominantly (51.1%) in lower socio-economic group.

The corneal ulcer was four times more common in rural population as compared to the urban group. Although the number of cases in urban group were few, the incidence of bacterial infection in urban group was found higher than the infection in the rural group, especially in females. While fungal infection was more common in rural group especially in males.

Out of 102 corneal ulcer cases 22 (21.6%) showed bacteria on direct microscopy, however, only 18 (17.6%) could yield bacteria on culture.

Effect of prior antibiotic therapy on isolation of bacteria was found to be a significant factor. The incidence of infection in the patients without prior antibiotic therapy was found to be significantly higher than those with prior local antibiotic therapy (P value < .001). Corticosteroids along with antibiotics was found to be the most important predisposing factor in the causation of bacterial ulcerative keratitis (50%). The presence of foreign body in 33.3 percent cases and trauma in 16.7 percent cases was found responsible for bacterial ulcerative keratitis.
In bacterial type of ulceration the size of ulcer was 4-5 mm in diameter, slightly bigger than the fungal type (83.3%). The ulcers were central or para-central in 83.3% of the cases. Amount of exudate was copious in most of the cases (77.8%); only in some it was found to be scanty. In the majority of the cases (88.9%) the exudate was moist and it was dry in only 2 cases. The colour of the slough in most of the cases (61.1%) was yellow, whereas in 38.9% percent cases it was white. Hypopyon was present in only some (16.7%) cases of bacterial ulcerative keratitis, whereas it was absent in most of the cases (83.3%).

Out of 18 corneal ulcer cases which were infected by the bacteria, *Staphylococcus aureus* was the main pathogen isolated from 55.6% percent cases. *Staphylococcus epidermidis* was isolated from 16.7% percent cases. *Streptococcus pneumoniae* and *Streptococcus faecalis* each from 11.1% percent and *Streptococcus haemolyticus* from 5.5% percent cases were isolated.

Ciprofloxacin was found to be the most effective antibacterial agent. 88.9% percent bacteria isolates were sensitive to Ciprofloxacin. Gentamycin was the next drug and bacterial sensitivity to this agent was 77.8 percent. 61.1% percent bacteria were sensitive to Erythromycin and Tetracycline. While 50% bacterial
isolates were resistant to Chloromycetin. Only 38.9 percent bacteria were found sensitive to Ampicillin and Co-trimaxazole.

In keratomycosis trauma by vegetative matter was the most important predisposing factor in 51.9 percent cases. Use of corticosteroids and antibiotics predisposed about 40.7 percent cases and foreign body in the eye was responsible for only 7.4 percent cases of ulcerative fungal keratitis.

Contrary to the bacterial keratitis, in keratomycosis, the size of the ulcer was smaller (2-3 mm.) in diameter in most of the cases (55.6%). Position was central or para-central in majority of cases (77.3%). Exudation was copious in 59.3 percent while in 40.7 percent cases it was scanty in contrast to bacterial keratitis. In most of the cases the ulcer was moist (92.6%). Contrary to bacterial keratitis in fungal infection the colour of the exudate was white in most of the cases (66.7%). The majority of the cases (56.7%) had hypopyon in fungal keratitis in contrast to only 16.7 percent of bacterial keratitis.

Out of 102 clinical samples, 30 (29.4%) cases showed fungal elements on direct microscopy while on culture only 27 (26.5%) could yield fungal growth.
In the present study Aspergillus was isolated from 59.2 percent of cases. Fusarium was isolated from 14.9 percent cases. Curvularia, Penicillium and Phialophora, each was isolated from 7.4 percent cases. Only one case showed growth of Helminthosporium among cases of keratomycosis.

Ketoconazole was found the most effective antifungal drug and 96.3 percent of the fungal isolates were found sensitive to this drug. Next drug in efficacy was Clotrimazole; 77.8 percent of the isolates were found sensitive to it. The sensitivity of Natamycin was 62.9 percent. All the five isolates of Aspergillus flavus were resistant to Natamycin.

Samples from healthy eyes were collected for bacterial and fungal culture. Out of 25 control cases bacteria were isolated from 12 percent cases including Staphylococcus epidermidis and Diphtheroids. While culture for fungus was positive in 8 percent cases, Aspergillus niger and Helminthosporium each was isolated from one case.
On the basis of analysis of results, the following conclusions could be drawn:

1. Corneal ulcers were four times more common in males as compared to females.
2. The poor, belonging to low socio-economic status were mostly affected by the disease.
3. Farmers, their housewives and labourers were the occupational groups which constituted majority of cases.
4. Rural group was about four times more predisposed to corneal ulcers as compared to the urban group.
5. 44.1 percent corneal ulcer cases developed infection.
6. Bacterial infection was detected in 17.6 percent cases, while fungal infection was observed in 26.5 percent cases.
7. In urban population bacterial keratitis was more common whereas in rural group fungal infection was found to be more prevalent.
8. Incidence of bacterial infection was high in cases who did not use prior local antibiotics in comparison to those who had prior antibiotic therapy.
9. In ulcerative keratitis, the use of corticosteroids with antibiotics was found an important predisposing factor to bacterial infection while trauma by vegetative matter was the most important predisposing factor in fungal type of keratitis.
10. Gram positive cocci, including *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus pneumoniae*, *Streptococcus faecalis* and *Streptococcus haemolyticus* were the pathogens isolated.

11. Gram's negative organisms have not been isolated in the present study because most of our patients had been using Ciprofloxacin prior to collection of samples. It has been reported that the drug is more effective against Gram's negative bacteria as compared to Gram's positive bacteria (Parks et al., 1993).

12. Ciprofloxacin was the most effective drug for bacterial ulcerative keratitis. Hence the drug should not be used indiscriminately to avoid development of resistant strains.

13. *Aspergillus fumigatus*, *Aspergillus flavus*, *Aspergillus niger*, Fusarium, Curvularia, Penicillium, Phialophora and Helminthosporium were the fungi isolated from clinical samples in the present study.

14. The most potent antifungal agent in the present study was ketoconazole. But for Fusarium the best drug was Natamycin.

15. In bacterial corneal ulcers, size of the ulcer was bigger, the colour of exudate was mostly yellow and the hypopyon was usually absent, whereas in fungal keratitis size was comparatively smaller, colour was usually white and the hypopyon was present in majority of the cases.
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16. A study of normal microbial flora is important because a native flora may be a source of infection in vulnerable hosts after trauma.

17. Injudicious use of antibiotics and corticosteroids should be avoided by the clinicians.

18. It is suggested that treatment should be started only after making a correct diagnosis at an early stage.