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Aetiology and risk factors of bacterial corneal ulcer in tribal population of Jharkhand

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Abstract
Introduction: Corneal is a transparent avascular structure forming one sixth of outer fibrous coat and responsible for two third of refractive power of eye. Breach in epithelium with involvement of stroma either due to infective or inflammatory cause lead to painful condition called as corneal ulcer.
Purpose: to find aetiology and predisposing factors of corneal ulcer in tribal population of Jharkhand.
Materials and Methods: This was a prospective observational study conducted at tertiary care centre of Jharkhand from May 2017 to May 2019. All cases of bacterial corneal ulcer were examined under slit lamp examination. Scraping of ulcer bed was done and was sent to microbiological department for further evaluation.
Results: A total of 78 patients identified with bacterial corneal ulcer of which 58.97% were males, 37.17% were farmers. Trauma was seen as major predisposing factor in 75.64% cases. The major etiological agent was found in our study was Staphylococcus aureus (60.25%) followed by Pseudomonas in 16.66% and mixed infection in 7.69%.
Conclusion: Study suggests major etiological agent was Staphylococcus aureus and major risk factor was trauma.

Keywords: Bacterial corneal ulcer, Staphylococcus aureus, trauma

Introduction
Cornea is transparent structure forming one sixth of outer fibrous coat of the eyeball. Thickness of cornea in the centre is about 0.52mm while at the periphery it is about 0.7mm. Primary physiologic function of cornea are to act as refracting medium and to protect the intraocular contents [1].
A corneal ulcer is a break in the epithelium with underlying stromal necrosis which results permanent corneal opacity, it may lead to significant visual impairment, blindness or if not taken care of may lead to even loss of eye. In India there are over12 million blind people of which 15.4% are corneal blind, out of which 9.34% are solely due to corneal ulceration [2]. Corneal ulcer is one of the most common entity encountered in daily practice and the affected people are farmers, miners etc. [3]. So, even best treatments are available, still it poses a challenging problem for ophthalmologist as varied etiologies, risk factors and prognosis in different area. Early diagnosis and prompt treatment may prevent vision threatening sequelae. In India various studies have explored the epidemiological risk factors for developing corneal ulcer but very few have studied risk factors in tribal population of Jharkhand.

Materials and Methods
A study was conducted at RIO, RIMS Ranchi on patients of clinically suggestive corneal ulcer attending ophthalmology OPD and IPD during May 2017 to May 2019.Criteria for enrolment were presence of signs of corneal ulcer at slit lamp examination(i.e., epithelial defect, underlying stromal infiltrate with signs of acute inflammation e.g., conjunctival injection, anterior chamber cells, flare hypopyon etc.). A detailed clinical history of patient was taken and both general and local examination of affected eye with slit lamp biomicroscopy was done. Ulcer detailed were noted and necrotic debris was removed with sterile normal saline. Scrapings from ulcer bed was done by using a sterile Bard Parker blade no. 15 after instillation of topical anaesthetic eye drops and it was sent to the microbiology department for further evaluation. A digital photograph was taken of the ulcer at each visit. Meanwhile the treatment was initiated as moxifloxacin 0.5% eye drops. Appropriate oral antibiotics was added if required.

Patients with severe corneal ulcer were admitted for inpatient treatment until frequency of eye drops had reduced. If ulcer did not respond to maximal medical treatment surgery was offered. Patients were followed up for a period of 6 weeks. This Study protocol was certified and accepted by institutional ethics committee of RIMS, Ranchi. This study was conducted under the aegis of declaration of Helsinki and proper consent from patients was taken. All the findings were documented in a standard performa prepared with the help of faculty members of department of Ophthalmology. This was a prospective study to identify the causative organism, predisposing factors, age, gender and occupation of patients.

Statistical Analysis

Statistical analysis was done with the help of descriptive statistics and result was expressed in percentage.

Results

A total 78 cases included for study after meeting the inclusion criteria. In this study corneal ulcer was more common in males (58.97%) [Figure 1]. Farm workers were most commonly affected occupation group (37.17%) followed by labourers [Table 1]. 21.79% children were affected. Lower middle class and poor accounted for almost two third cases of corneal ulcer [Table 2]. Total of 11 (14.10%) patients had associated eyelid and adnexal problems.

In this study, central corneal ulcer (in central 5mm diameter) was noted in (11.53%) cases and peripheral corneal ulcer (within 3mm from limbus) was seen in (88.46%) cases. Hypopyon seen in 23.07% of cases of corneal ulcer. On bacteriological examination, it was found that in 70% cases, causative organism were gram positive cocci, followed by gram negative bacilli (16%). Staph aureus was seen in 60.25% of isolates, Pseudomonas aeruginosa in 16.66%, mixed infection in 7.69% [Figure2]. Definite history of trauma was noted in 75.64%, in which vegetative matter such as paddy husk, plant leaf etc constituted around 65.38%, flying insect 11.53%, brick/iron chip 7.69% [Figure 3]. Overall presenting visual acuity in affected eye fulfilled the WHO criteria for in severe vision impairment in 67.91% [detailed in Table3].

Discussion

In this study we have explored causative organism, epidemiological risk factors for bacterial corneal ulcer. This study males clearly had higher incidence of corneal ulcer than female. This can be correlated by study by Srinivasan *et al.* [4], this may be due to outdoor nature of work performed by male. 75.64% patients had history of trauma implicated vegetative matter most common traumatic agent as most tribal population reside in rural area and involved in farm work.

Present study showed Staphylococcus aureus as major causative organism in corneal ulcer. This was also seen in study done by Asbell P *et al.* [5]. In 33%, Mahajan *et al.* [6] in 31%, Rao *et al.* [7] in 35%. Incidence of Staphylococcus Alba was seen in 19.23% cases in pure culture and 7.69% in mixed culture. study Done by Nema *et al.* [8] found Staph alba in 33.6% of cases, Rohtagi *et al.* [9] in 50% cases, and Asbell P *et al* in 16% cases, So Staphylococcus aureus and albus are the major causative organism in case of bacterial corneal ulcer. Streptococcus relatively uncommon pathogen for bacterial corneal ulcer. In this study Streptococcus pyogenes found in 3 cases (3.84%) in pure and 2 cases (2.56%) in mixed culture. Nema *et al.* [7] found Streptococcus viridans in 3% and Asbell P *et al.* [4] in 1% cases.

Among gram negative organism Pseudomonas is the most common, as in 16.66% cases this was isolated as pure culture whereas Study done by Nema *et al.* [7] found in 5.5% cases and Rohtagi *et al.* [8] in 3.5%cases, So we can conclude that there is higher incidence of Pseudomonas among tribal population. Mixed culture was seen in only 7.69% in those patient who had history of trauma.

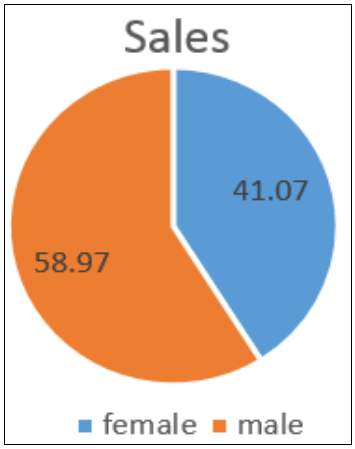

Fig 1: Sex Incidence (%)

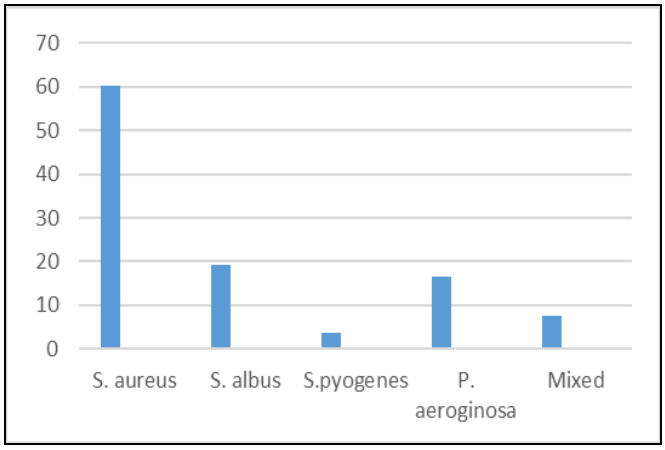

Fig 2: incidence of different pathogens (%)

Table 1: incidence of corneal ulcer in different occupation

Type of occupation	No of cases	percentage
Farm workers	29	37.17
Labourers	9	11.53
Milkmen	1	1.28
Florist	4	5.12
Businessmen	2	2.56
student	7	8.97
housewife	4	5.12
Children	17	21.79

Table 2: Corneal ulcer in different socioeconomic strata

Socio economic status	No of cases	Percentage
Higher	5	6.41
middle	19	24.35
Lower middle	32	41.02
Poor	22	28.20

Table 3: Visual outcomes in patients of corneal ulcer

Visual Acuity at presentation	Number	Percentage
Normal (<6/9)	2	2.56
Mild (6/9 to 6/18)	3	3.84
Moderate (6/18 to 6/60)	14	17.94
Severe (6/60 to 3/60)	53	67.91
Blind (>3/60)	8	7.69
Visual Acuity at final visit		
Normal (<6/9)	00	00
Mild (6/9 to 6/18)	13	16.66
Moderate (6/18 to 6/60)	10	12.82
Severe (6/60 to 3/60)	30	38.46
Blind (>3/60)	25	32.05

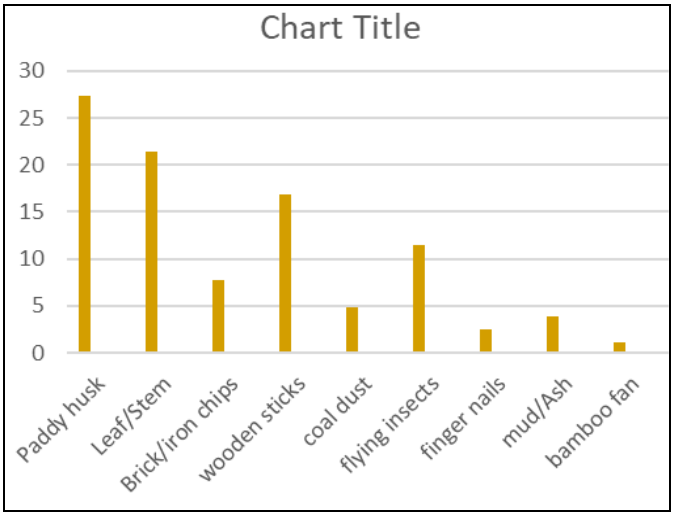

Fig 3: Traumatic agents (%)

Conclusion

in this study 78 cases of bacterial corneal ulcer were studied in details to explore various aetiological factors responsible for causation of bacterial corneal ulcer. Males were affected more commonly. The major aetiological agent in our study was Staphylococcus aureus. Pure growth seen in 60.25% and mixed microbial growth seen in 7.69%. Vegetative matter are the most common traumatic agent noted. Farmers and labourers are the more prone occupation for corneal ulcer.

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