Original Research Article

A Clinical Study to Evaluate the demographic characteristics of Corneal Ulcer

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Abstract

Introduction: To effectively prevent blindness in patients with corneal ulcer, a proper understanding of risk factors pre- disposing to ulceration, and clinical and microbial characteristics of the disease is essential. **Aim:** The aim of this study was to know the age and sex distribution of corneal ulcer. To identify the predisposing factors, etiological factors contributing to corneal ulcer. To study the clinical features and management of corneal ulcer. **Material and methods**: Study was undertaken among 80 patients who were diagnosed to have corneal ulcers for a period of 7months. This is an observational study to identify the common etiological agents, predisposing factors, age, gender, and occupational distribution and to study the clinical features.**Results:** Corneal ulcers were common in age group 3rd and 4th decade (55%) More common in males. Male to Female is 1.63:1 Corneal ulcer was commonly observed in rural population (65%), and low socio economic status (60%).Most common in people whose occupation was Agriculture (48%). Ocular trauma was the major predisposing factor in majority of cases (46.25%).In viral keratitis Herpes simplex virus was more associated with corneal ulcers.10%KOH wet mount and Gram stain were helpful in initiation of antimicrobial therapy.10%KOH wet mountal one could identify fungi in 80.95% of culture positive cases. Culture positivity was 56.94%.Fungi namely Filamentous fungi was common etiological agent isolated (29.16%). In Fugal ulcers –Fusarium sp. was commonly isolated. 85% of Bacterial isolates were gram positive cocci.**Conclusion:** Improvement in laboratory facilities, early diagnosis and early initiation of therapy can save vision in case of corneal ulcer.

Keywords: Corneal ulcer, viral keratitis, Vision.

Introduction

Corneal ulcer is characterized by an epithelial break convoyed by underlying stromal necrosis[1]Many of these cases may transform to the complications and loss of vision in the end.This made a stimulation to study the clinical evaluation of corneal ulcer in detail.Globally it is estimated that ocular trauma and corneal ulceration, result in 1.5 to 2 million new cases of corneal blindness annually[2].

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According to WHO, corneal diseases are among the major causes of vision loss and blindness in the world today, second only to cataract in overall importance[3]. Corneal blindness is a major problem in India, which adds a substantial burden to the community in general and health care resources. Further individuals with corneal blindness are usually of younger age group compared with those suffering from cataract. Hence in terms of total blind years the impact of corneal blindness is greater. In India approximately 6.8 million people have unilateral corneal blindness, with vision less than 20/200 in atleast one eye and of these,about a million have bilateral corneal blindness. It is expected that the no. of corneal blind people in India will increase to a staggering 10.6 million by the end of 2020[4]. Corneal ulceration in developing countries has

only recently been recognized as a 'silent epidemic'. Gonzales et al, 1996 found that the annual incidence of Corneal Ulcer was 113 per 100,000 people (in Madurai South India) which was 10 times the annual incidence of 11 per 100,000 as reported in USA. In the recent APEDS (Andhra Pradesh eye disease study) conducted by L. V. Prasad Eye Institute, Hyderabad from 1996 to2000 it was found that 7% ofcorneal blindness is because of corneal ulcer[5].Many cases with corneal ulceration end up with corneal blindness or still disastrous outcome such as corneal perforation, endophthalmitis orphthis is bulbi. About 60-70% of corneal scar/ Adherent. Leucoma are result of neglected or improperly treated corneal ulcers.Microbial keratitis and more so incidence of fungal keratitis is on the rise in the densely populated continents of Asia and Africa. Fungal keratitis is the major cause for corneal blindness in Asia amounting to 44 percent of central corneal ulcer [6].Ongoing research towards rapid diagnosis and specific drug therapy could minimize the morbidity caused by this preventable disease.

Material and Methods

The study was conducted at SKMCH, Muzaffarpur from May 2020 to November 2020. The study was approved by the institutional research and ethical committee. Before undertaking the study due Ethical clearance was taken from the Institutional Ethics and Research Committee. Written Informed consent was taken from all the study participants after duly explaining to them the importance and purpose of the study. The present study was undertaken among the patients who were diagnosed to have corneal ulcers, at the outpatient Department of our Institution. This is an observational study to identify the common etiological agents, predisposing factors, age, gender, and occupational distribution and to study the clinical features and management of corneal ulcer. 80 cases were selected for detailed study. The definition of corneal ulcer was taken as epithelial defect with inflammation of cornea.

Inclusion Criteria: With the consent of the patient & the clinical features consistent with the corneal ulcer, age above 1 year, both the sexes and traumatic cases.

Exclusion Criteria: Neonates and surgical trauma cases, and patients with corneal degenerations and dystrophies are excluded from the study.Ophthalmic Examination: Consisting of visual acuity recording, external examination and slit lamp examination of the anterior segment of the eye. Grading of the severity of the ulcer was done taking into consideration the DB jones criteria and location of ulcer.The criteria for severe ulcer: Large size, infiltration more than 6 mm, deep stromal involvement, central location of ulcer threatening visual acuity,marked stromal thinning with impending perforation, presence of hypopyon and sclera involvement.Laboratory Investigations: Routine investigations,Syringing of naso-lacrimal passages, RBS, CBP, ESR, CUE, Fluorescein staining, Corneal scrapings, Smears or Staining, Culture- Corneal scraping were immersed in nutrient broth, which was brought from microbiology lab,and then promptly transported back for smearing on culture plates for bacteria and for fungi separately. Nutrient agar, Saboraud's dextrose agar and Blood agar are used forculture.

Results

The following data is the analysis of the study which was conducted on 80 patients with corneal ulcer, fulfilling the inclusion criteria, who attended the ophthalmic OPD at SKMCH, Muzaffarpur from May 2020 to November 2020.Incidence of corneal ulcer was more common in 3rd and 4th decade that is middle age group. In this study, corneal ulcer is more common in males. 60% of the cases belong to low socio economic status, as malnutrition, poor sanitation is more common in this group.Incidence was more among rural population as they are more involved in works prone to corneal ulcer like agriculture, construction, mining etc. Out of 80 cases, 60 cases sought treatment between 1-10 days. Ulcer is considered central if it is present in the central 5mm diameter.Ulcer is considered peripherally fit is present within 3mm from the limbus. In this study out of 80 cases , 55% cases had stromal infiltrate of < 6mm diameter. Out of 80 cases, hypopyon was found only in 23 cases.Out of 72cases, 41were culture positive i,e.56.94% and 0ut of 41 culture positive, 21 were fungal isolates and 20 were bacterial isolates.Most common cause of corneal ulcer is fungal 80.95% of culture positive fungal ulcer.Out of 21 cases, 17 cases (81%) were Fusarium spp., 4cases were Aspergillus spp

Management of corneal ulcer

Out of 80 cases in whom treatment has been initiated, Atropine 1% eye ointment or Homatropine 2% eye drops, Tablet Vitamin C, Eye shield/ shade was used along with specific treatment.Gram staining and10% KOH mount done and the treatment was initiated accordingly.From the culture reports, 21 cases were showing fungal pathology, 20 cases bacterial, and remaining were sterile.

Table 1: Age distribution, sex distribution and socioeconomic distribution

Age in years	No. of cases	Percentage
1-10	3	3.75
11-20	7	8.75
21-30	21	26.25
31-40	23	28.75
41-50	10	12.5
51-60	9	11.25
Above 60 years	7	8.75
Sex Distribution		
Males	Males	Males
Females	Females	Females
Total	Total	Total
Socio-Economic Status		
Low	Low	Low
Middle	Middle	Middle
High	High	High
Total	80	100

Table 2: Details of corneal ulcer in present study

Living Conditions	No. of cases	Percentage
Place		
Rural	52	65
Urban	28	35
Occupational Distribution		
Agriculture	38	47.5
Industrial	19	23.75
Housewives	10	12.5
Students	7	8.75
Others	6	7.5
Duration of treatment before seeking treatment		
< 10 days	60	75
<20 days	13	16
20 and more	7	9
Total	80	100
Local Predisposing factors		
Ocular trauma (including for-eign bodies)	37	46.25
Dacryocystitis	6	7.5
Eye lids or lashes abnormalities	3	3.75
Decreased corneal sensation	4	5
Contact lens wear	3	3.75
Systemic	--	--
Diabetes	6	7.5
AIDS/HIV	--	--
Immuno suppressive drug use	--	--
None	21	26.25
Symptoms of corneal ulcer		
Pain	66	82.5

Redness	80	100
Watering	80	100
Diminution of vision	62	77.5
Photophobia	31	38.75
Foreign body sensation	80	100

Table 3: Location of corneal ulcer, size of infiltrate and hypopyon in corneal ulcer

Location of corneal ulcer	No. of cases	Percentage
Location		
Central	36	45
Peripheral	21	26.25
Both sides	23	28.75
Size of Infiltrate		
<6mm in diameter	44	55
>6mm in diameter	36	45
Hypopyon in corneal ulcer		
Absent	57	71.25
Present	23	28.75

Table 4: Culture results in study

Culture	No of patients	Percentage
Culture positives	41	56.94
Culture negatives	31	43.07
Culture results		
Fungal	21	29.16
Bacterial	20	27.77
Sterile (negative)	31	43.07
Bacterial Results		
Gram Positive Bacteria		
Bacteria	n=20	Percentage
Staphylococcus aurueus	6	30
Coagulase Negative staphylococcus	6	30
Streptococcus pneumonia	3	15
Other streptococcus	2	10
Gram Negative Bacteria		
Pseudomonas	3	15

Table 5: Comparing present study with other studies

Name of the study	Bacterial Isolates (%)	Gram positive bacteria(%)	Culture positive (%)
Current Study	27.77	85	56.94%
Leck A.K. et al[16]	23.9	80	68.71%
Srinivasan M.et al[8]	47.1	79	68.4%
Sharma et al[6]	--	--	56.70

Discussion

Corneal ulcer is one of the predominant causes of blindness and ocular morbidity in developing countries. In this study, majority of the patients (55%) were in 3rd and 4th decade that is middle age group, as they are more involved in out- door and physical activities and are exposed to risk factors morefrequently.In a study by Panda A. et al[7] performed on thousand eyes of thousand patients, 50% of the patients with corneal ulcer were aged between 36 and 65 years. The present study showed similar age distribution. The incidence of microbial keratitis was higher in males (62%) than in females (38%) with Male to Female Ratio 1.63:1. This ratio is near to that reported by Srinivasan M. et al[8], (1.6:1). Males form the majority of working class, hence exposure to risk factors is more. Both sexes tend to develop corneal ulcer in the 3rd to 5th decades of life when presumably they are more physically active and are at higher risk of corneal injury. From the APEDS

study [5], trauma and keratitis were the most com mon cause of corneal blindness in males,whereas traditional medicine and post cataract surgery in females. In the current study out of 80 cases, 60% of cases belong to low socioeconomic status. 62cases (65%)are from rural areas, and 35% are from urban areas. The incidence is more in them because of more chance of exposure to injury, lack of awareness of the problems, delay in consulting ophthalmologist, using native modalities of treatment like application of some irritants in eye and removal of foreign body with unsterile material.The biggest group of the patients were agricultural workers (47.5%), followed by industrial workers (23.75%), housewives(12.5%),and students (8.75%). Agri-culture is major occupation in this district.These patients are more prone for ocular trauma more with organic material, hence fungal ulcers are common. In a study conducted by Bharathi MJ et al [9], 64.75% of patients with fungal keratitis were agricultural workers. Trauma was the second major cause of corneal blindness in our population- most common cause of unilateral vision loss in developing countries. By far the most common predisposing risk factor for corneal ulcer in south India was a history of corneal injury[5]. In the current study, out of 80 cases, 37 cases had Ocular trauma and foreign body in eye, which contribute to 46.25% of total cases. In developing world non- surgical ocular trauma accounted for 65.4% & 48.6% of all corneal ulcers[8] respectively.

The current study is nearly comparable to this study. In developed countries contact lens wear is the major risk factor. According to APEDS study common cause of corneal blindness is keratitis in childhood followed by trauma. And the most common cause of trauma in urban area is flying/ thrown objects, and the rural area is due to vegetative matter. Common clinical characteristics of fungal corneal ulcer in this study were long duration of history, dry, raised necrotic slough in 80% of cases and satellite lesions in 60% of cases. While bacterial keratitis features were short duration of history, grayish white with purulent slough in 70% cases. Viral keratitis was identified by vesicular lesions on face and lids for Herpes Zoster and by punctuate keratitis in herpes simplex. Majority of patients presented with symptom complex mostly with pain, redness, watering and diminution of vision. Central cornea was involved in majority of cases. In 36 patients only central, and in 23 patients both central and peripheralcorneawasinvolved.In majority cases the area of infiltrate was < 6 mm in diameter and the depth of infiltrate was < 2/3 of stroma. The ulcers which were in peripheral location, smaller area of infiltrates and less depth had good visual outcome after healing. Studies have shown that larger Infiltratesat presentation was a significant predictor of worse 3 month infiltrates / scar size. Larger epithelial defect was a significant predictor of perforation. Predictor of longer time to re-epithelialization include infiltrates size at presentation and older age[10].A large lesion > 6mm was significant predictor for poor visual outcome[11] . In the current study, in majority of cases where symptoms were less with satellite lesions, thick, large hypopy on, irregular infiltrate margins, endothelial infiltrate, fungal culture was positive. The best correlates in fungal Keratitis were Occupation (Agriculture), Central location, Size< 5mm, Depth > 50% of stromal thickness, 10% KOH smear positive.Out of 80 cases,corneal scrapings were taken from 72 cases, as the 8 cases were diagnosed as viral keratitis clinically. These 72corneal scrapings were subjected to10% KOH mount, Gram staining and culture. From these scrapings KOH mount could identify fungal organisms in17cases(23.61%). Whereas culture showed fungal growth in 21cases (29.16%). 10% KOH wet mount positive and culture positive were 17cases, Whereas 10% KOH negative and culture positive were 4 cases. Hence, KOH 10% wet mount could identify fungal hyphae in 17 cases i.e., 80.95% of culture positive fungal ulcers. Due to this high sensitivity of 10% KOH wet mount, we can start treating the fungal ulcercases before the culture reports are available.In studies by Garg.P. et. al.[12] 10% KOH sensitivity in identifying fungal hyphae is 90%. There is high prevalence of fungal keratitis in South India. The Prevalence of fungal pathogens in South India is 44% Sharma.S. et. al,[6] was significantly greater than studies in Nepal 17% Madan. P.Upadhyay et. al13, in Bangladesh 36% Dunlop A.A. et al[14], in Ghana 37.6% Hagan M, et al[15] In the present study the incidence of fungal keratitis islower (29.16%) compared to the above studies, but fungal isolates were more when compared to bacterial isolates. In fungal isolates all were filamentous fungi. In17cases of 21i.e.81% it was Fusarium and in only 4 cases it was Aspergillus spp i.e., 19%. In most of the studies Filamentous fungi were the major fungal pathogens. In Studies by Srinivasan. M. et al[8] and Leck. A.K. et al [16] Fusarium was common, 47% and 39.9%; Aspergillus 16% and 21.5% respectively. In a study by Taneja M et al[17], at L.V. Prasad eye institute, Hyderabad, on Microbial keratitis following vegetative matter injury on 49 patients, showed that corneal infections following vegetative matter injury show a varied etiological profile, however bacterial and polymicrobial infections are more prevalent. Empirical antifungal therapy, as commonly practiced, mustbe avoided in cases with vegetative matter injury.In the

present study also injury with vegetative matter resulted in not only fungal ulcer, but also ulcers due to other organisms. From the 72 smears for gramstain, bacterial organisms were found in 24% scrapings. Out of all cultures, 27.77% showed growth of bacteria. From this study it is observed that gram staining can be used to initiate proper therapy before culture reports are available. Bacterial Isolates in the present study was observed in 20 cases(27.77%).In studies by Leck A.K.et al[16] in south India (23.9%), Srinivasan. M. et al [8] in Madurai south India(47.1%).Hence antibiotics were continued with decreased frequency.4 cases showing clinically bacterial not responding to initial Fluoroquinolones, antibiotic was changed to fortified eyedrops.Response was goodinall cases except for3 cases refractory to treatment, showing no signs of improvement were referred to higher center. Out of 80 cases in this study, majority (87%) patients responded well to treatment. But on follow up it was observed that all patients presented with varying degrees of corneal opacities after healing. 11 cases were refractory to treatment. Many refractory cases were fungal corneal ulcers. Corneal perforation was observed in 3 cases and descemetocele in 1case. All these cases were referred to higher center for further management.

Conclusion

Corneal ulcers, mostly infective are noticed in active age group from 30 to 50 years and outdoor workers like agricultural laborers and construction workers, associated with predisposing factors like malnutrition or poor hygiene. Common etiological factors are mainly fusarium speciesand gram positive organisms. Early & accurate diagnosis and in- tensive treatment is essential for visual restoration.

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