Clinical study of Fungal corneal ulcer

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ABSTRACT

Aims & Objectives: To study the mode of presentation, risk factors and clinical presentation of fungal corneal ulcer, investigations regarding the type of fungus and the statistics regarding the common type of fungi that involve the cornea.

Materials & Methods: The materials for the study were drawn from corneal ulcer patients attending the Outpatient Department of Ophthalmology and 40 patients with fungal corneal ulcers were recruited for the study.

Results: Majority of patients were in the age group of working population from 21 -65 years. It was least in very young and old patients.Fungal ulcer was more common in males. Most of the patients were farmers (57%), followed by homemaker (15 %), others (13%) . The majority of patients 12 (30%) had trauma with vegetative matter.77.5 % were from rural areas whereas the rest of the 22.5 % were from urban areas.Fusarium was the commonest organism identified in 30% of patients followed by Aspergillusflavus(25%).

Conclusion: Microbiological work up goes a long way in facilitating specific therapy in fungal corneal ulcers. Potassium Hydroxide (KOH) mounts were in agreement with fungal culture in 62.5%of cases and so it can be used as a quick and reliable method to find out fungal etiology of corneal ulcers and treatment can be started immediately without waiting for the culture reports to arrive.

Keywords: Fungal corneal ulcer, KOH mount, Fungal culture

INTRODUCTION

Corneal ulcer is a major public health problem in the developing world causing prolonged ocular morbidity and visual impairment.[1] While cataract remains the major cause of reversible visual loss, diseases of the cornea are emerging as an important cause of visual impairment. Trachoma and vitamin A deficiency has traditionally been the major cause of corneal blindness.With the introduction of SAFE strategy for trachoma and mass distribution of vitamin A capsules, both these conditions have now been under control. Corneal blindness is responsible for 1.5 to 2 million new cases of monocular blindness every year in which ocular trauma and corneal ulceration are significant contributors.[2]

In a vast agricultural country like India, particularly where primary health care and referral systems are weak, minor eye injuries sustained in agricultural farms often lead to corneal ulceration of fungal etiology and loss of vision[3]. The reported incidence of corneal ulceration in India is 1130 per million population[4].

Corneal infections of fungal etiology are common in India (19-45%). Aspergillus (16–53%) and Fusarium (10–45%) are the common incriminating pathogens[1]. Ocular morbidity in fungal infections tends to be greater than that in bacterial keratitis, because the diagnosis is often delayed and available drugs are not very effective. History of injury with vegetable matter, dry looking ulcer, feathery edges, satellite lesions, endothelial plaque and thick hypopyon form a typical presentation. But early diagnosis is confounded by similar clinical appearances seen in infections with organisms like Herpes simplex, Nocardia, Actinomyces, Streptomyces, Mycobacteria and Acanthamoeba[3]. Polymicrobial infection and prior treatment with variety of medications, sometimes indigenous medicine added to difficulty in diagnosis.

Materials and Methods

The study was carried on 40 patients attending the Ophthalmology department from September 2015 to September 2017.study was conducted after approval for the study protocol and clearance were obtained from the ethical review committee of the institute to which the hospital is affiliated. Informed consent from all the patients included in the study was taken.

All corneal ulcer patients with positive 10% KOH preparation and/or positive fungal culture results were included in the study. Each patient was subjected to a detailed history taking followed by detailed ocular examination.Patients were advised to get admitted to the hospital for observation and better follow up. If not they were advised to attend follow

up in OPD without fail.Examination of anterior segment and corneal ulcer was done in detail with the help of a slit lamp biomicroscope. Visual acuity was recorded by using Snellen's chart. Lacrimal sac syringing ,Fluorescein staining were done for all cases.

Routine laboratory investigations like Complete haemogram,RBS,complete urine examination,HIV, HBsAg were done.

The sample for microbiological investigations was obtained by corneal scraping. The cornea was anaesthetized using 0.5% proparacaine solution and scraping was done using sterile No. 15 Bard Parker blade from the margins of the corneal ulcer.Gram's staining and 10% KOH preparation were done .Bacterial culture done by using blood agar and chocolate agar. Sensitivity was done using disc diffusion method if organisms were isolated.Fungal culture was done using Saboraud's dextrose agar medium. Negative culture reports were declared at the end of 14 days.

RESULTS

The following observations were made from the present clinical study and the results are tabulated.

Table 1: Age distribution of patients

Age (Yrs)	No. of Cases	Percentage (%)
< 20	2	5
21-40	14	35
41-65	21	52.5
> 65	3	7.5
Total	40	100

Above table shows that majority of patients were in the age group of working population from 21 -65 years. It was least in very young and old patients. Majority of the patients in this study were male (72.5%) and the rest of the patients were females (27.5 %).

Table 2: Occupation of patients

Occupation	No. of Cases	Percentage (%)
Farmer	23	57.5
Homemaker	6	15
Tradesman	3	7.5
Carpenter	2	5
Manual Labourer	1	2.5
Others	5	12.5
Total	40	100

The above table shows that most of the patients were farmers (57%), followed by homemaker (15 %), others (13%) category which included other professions like students and engineers, shopkeepers (7%), carpenters (5%) and one manual labourer in that order. Many patients gave history of trauma to the eye with various agents. The majority of patients 12 (30%) had trauma with vegetative matter. 11 patients (27.5 %) gave history of fall of stone into the eye. 10 patients (25 %) had history of trauma with other agents like dust, animal tail and finger nail. Only 7 (17.5 %) patients gave no history of overt trauma.In the present study 31 patients (77.5 %) were from rural areas whereas the rest of the 9 patients (22.5 %) were from urban areas and most 22 (55 %) of the corneal ulcers were located centrally, 12(30%) were located paracentrally and 6 (15 %) were peripheral in location.

Table 3: Fungal Culture results

Organisms isolated	No. of Cases	Percentage (%)
Fusarium	12	30
Aspergillusflavus	10	25
Aspergillusfumigatus	2	5
cladosporium	1	2.5
Rhizopus	1	2.5
No growth	14	35
Total	40	100

Fungal culture was positive in 26(65%) patients. After 15 days of inoculation of the SDA medium in 10 (25%) patients Aspergillusflavus was isolated. In 2(5%) patients Aspergillusfumigatus was isolated and 12(30%) patients Fusarium was the species. Two rare organisms like Cladosporium and Rhizopus were isolated in one patient each. In 14 patients no growth occurred.

Table 4: Topical treatment combinations used

Drugs	No. of Cases	Percentage (%)
Natamycin	26	65
Natamycin, Moxifloxacin	13	32.5
Natamycin, Voriconazole, Moxifloxacin	1	2.5
Total	40	100

All patients were put on topical natamycin 5% eye suspension. Among them, 65%were on natamycin only; 32.5% were on natamycin 5% and moxifloxacin 0.5% eye drops. One patient was treated with voriconazole 1% eye drops.

Table 5: Oral systemic antifungal treatment given

Drugs	No. of Cases	Percentage (%)
NIL	25	62.5
Fluconazole	13	32.5
Itraconazole	1	2.5
Terbinafine	1	2.5
Total	40	100

In the above table, it shows that 25 (62.5%) patients were not treated with any systemic antifungal. 13(32.5%) patient were put on systemic fluconazole 200mgtablets for atleast a period of 2 weeks. One patient was put on oral itraconazole 200mg BD tablets for 2 weeks and one patient was treated with oral terbinafine 250 mg tablets OD for 2 weeks.

DISCUSSION

Of the organisms that cause keratitis, fungi remain one of the most elusive and challenging organisms to diagnose and treat. It has also been shown that infection with fungal keratitis (FK) can be more virulent and damaging compared to that of a bacterial origin. Fungal keratitis in previous retrospective analyses was shown to be more likely to perforate the cornea than bacterial keratitis and lead to irreversible changes. Therefore, early diagnosis and treatment of fungal keratitis is therefore imperative to prevent vision threatening complications.

Among the 40 fungal corneal ulcer patients studied the commonest age group affected was between 41-65 yrs, followed by 21-40 years, >65 yrs and <20 yrs. Nath et al study stated that the commonest age group was between 41-50 years which was in agreement with the present study[5] .This has a considerable socioeconomic impact because this age group people are bread winners of the family. In similar other studies the commonest age group was 31-40 years[6,7]. Regarding the gender of the patients, in this study males (72.5%) were affected more than females (27.5%). In other similar studies male preponderance ranged between 65 to 68 %.[5] By the nature of their work profile men are more exposed to outdoor activities thereby increasing their vulnerability to the disease.

Homemakers (15%), others (13%) which included other professions like students and engineers, tradesmen (7%), carpenters (5 %) and one manual labourer in that order.Bharathi et al study stated that farmers contributed to 64.75%, homemakers 5.11%, students 8.11%, tradesmen 6.48%, unemployed 1% and labourers 14.52 %[6].This occupational preponderance was justified because trauma with vegetative matter was an important risk factor for the occurrence of fungal keratitis.

In this study 31(77.5%) were from rural areas whereas the rest of the 9(22.5%)were from urban areas. Studies done by Bharathi et al [6] Nath R et al [8]reported similar results.

There was history of trauma in 82% patients with various agents like vegetative matter, stone and other agents like animal tail and finger nail. 30% patients had trauma with vegetative matter because most of these patients were engaged in agricultural activity. In Bharathi et al study 92.15 percentage patients had corneal trauma and among them 61.28% were by vegetative matter[6].

In this study most (55%) of the fungal corneal ulcers were located centrally, 30% located paracentrally and 15% were peripheral in location. 50% of the ulcers belong to the category of <20 sq. mm, 32.5% to 41- 60 sq. mm category, 7.5% to 21-40 sq. mm category and 10% to 61-100 sq. mm category.In this study,the most common organism identified was fusarium (30%).The next common organism was Aspergillus flavus (25%), followed by Aspergillus fumigatus. In Chowdhary et al study, Aspergillus niger was found to be the most common species.[7]

In this study, no cases of Candida keratitis were found though there were 3 cases of diabetes which could have been a predisposing factor. Only one patient had infection with Cladosporium which is filamentous dematiaceous fungus. In other studies dematiaceous fungi (10-29%) have been isolated[9]. Yeast infection is generally low in India.

65% patients were treated with natamycin 5% eye suspension only, 32.5% were on natamycin and moxifloxacin eye drops. 10% patients used both natamycin and fluconazole eye drops. One patient was treated with voriconazole 1% eye drops. Natamycin was the preferred drug in this study because it has broad spectrum fungicidal activity and is available commercially at an affordable price to the poor patients.

The patient on voriconazole eye drops was not responding to the standard line of treatment. But in this case the ulcer did not show signs of healing, so penetrating keratoplasty was done later.

In Loch RA et al study, natamycin was the most commonly (96%) used treatment for ulcers caused by filamentous fungi followed by amphotericin (75%) and voriconazole (63%). However voriconazole (79%) was most often listed as the preferred topical treatment ideally compared with natamycin (55%).Approximately half of the respondents used combination topical therapy (56%) and the remainder monotherapy. The most common reasons cited for not using the preferred treatment were cost and a desire for further evidence to support preferred treatment.[10]

In this study, only those ulcers with deep stromal or full thickness involvement were treated with systemic antifungal in the form of oral fluconazole 200 mg tablets BD atleast for a period of two weeks. Fluconazole was preferred over ketoconazole because of lesser systemic side effects.

One patient with Aspergillusflavus infection was treated with itraconazole as it is preferred in filamentous fungal infection. One patient with Fusarium keratitis was treated with terbinafine tablets. A study by Xuguang et al showed that Fusarium species was susceptible to natamycin and terbinafine[11]. Out of 15 patients who were treated with systemic antifungal drugs 6(40%)healed whereas 9(60%) had complications like perforation and increase in infiltrate size.

In 90% of patients debridement was done as natamycin was the most common antifungal used and debridement enhances the drug penetration. In 2 patients debridement was not done for severe corneal thinning was present and risk of perforation by debridement, but eventually these ulcers had small corneal perforations. In one patient therapeutic penetrating keratoplasty at a higher centre was done at 4 weeks as he was not improving with the standard line of treatment and there were no graft related complications till the last follow up. In Chowdhary et al study, penetrating keratoplasty was done in 33% of patients[5] and in Tanure et al study 25 % of patients underwent keratoplasty[11]. In the present study few more patients needed therapeutic keratoplasty but it could not be done due to non availability of donor corneas.

CONCLUSION

Fungal corneal ulcer continues to be an important cause of corneal morbidity. The various demographic factors like age, sex and population were studied and it was found that most of the corneal ulcers are seen in the rural population especially who have trauma to the eye with vegetative matter.Microbiological work up goes a long way in facilitating specific therapy in fungal corneal ulcers. KOH mounts were in agreement with fungal culture in 62.5%of cases and so it can be used as a quick and reliable method to find out fungal etiology of corneal ulcers and treatment can be started immediately without waiting for the culture reports to arrive.

In this study Fusarium was the most common species among the culture positive cases followed by Aspergillus species.The superficial ulcers have healed well with natamycin eye suspension, which makes it the drug of first choice in filamentous fungal infections of the cornea.Systemic treatment is indicated in deep corneal involvement. It helps in prevention of further complications like perforation.

Surgical debridement of the ulcer in the initial stages helps in reducing microbial load and drug penetration. However caution has to be exercised in ulceration with thin floors. Penetrating keratoplasty should be resorted to in nonhealing ulcers and perforated ulcers subject to availability of healthy donor corneas.

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