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Study of etiology, predisposing factors and differential presentations of Mycotic Keratitis in the indigenous population of Manipur

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Abstract
Background: *Corneal blindness is a major public health problem worldwide and infectious keratitis is one of the predominant causes. About half of corneal ulcers are fungal in tropical zones where the population is predominantly rural. People living in a tropical climate and working in agriculture are clearly significant risks, possibly amplified by the lack of safety precautions in the less advanced agricultural societies.*
Aims: *To identify predisposing factors, causative fungi and to study different presentations of mycotic keratitis in the indigenous population of Manipur.*
Materials and methods: *A cross sectional study was conducted in 25 patients with suppurative corneal ulcer attending to Ophthalmology Department in collaboration with Department of Microbiology, RIMS Hospital, Imphal, over a period of 2 years. (October 2013 to September 2015).*
Results: *Highest incidence of mycotic corneal ulcer was found between 21-50 years of age. Males were only marginally more affected by corneal ulcer than females. Farmers were the most common occupational group affected by corneal ulcer (52%), followed by housewives (16%). The maximum number of corneal ulcer patients attended during the months of November–December (52%), followed by March-April (20%) and January-February (12%). Paddy leaf injury was the most common agent causing injury to the eye resulting in corneal ulcer, constituting 36% of all the ocular trauma. 50 % of the isolated fungi from SDA culture were found to be Fusarium Spp. and the rest 50% comprises of Aspergillus Spp. and Scedosporium Spp.*
Conclusion: *In the present study, it was found that corneal ulcer was common in 31-60 years of age, with marginally higher incidence in male sex. Farmers were most commonly involved regarding occupation and the most common cause of corneal ulcer was attributable to injury by paddy leaf during harvesting season, which falls in the months of November and December. Fusarium constituted 50%, Aspergillus and Scedosporium 25% each as fungal species causing keratitis.*
Keywords: *Mycotic corneal keratitis, culture*

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I. Introduction

Cornea is the transparent anterior wall of the globe. It is a highly specialized tissue that refracts and transmits light to the lens and retina. The tear-air interface, together with the underlying cornea, provides roughly two thirds of the total refractive power of the eye. It also provides structural integrity for the anterior part of the eye. It is a key barrier against infection.[1] The Cornea, being a major functional tissue of the eye and because damage to or disease of the cornea has serious visual consequences, the study of its structure, function and pathology have received much attention. Corneal blindness is a major public health problem worldwide and infectious keratitis is one of the predominant causes. Corneal infection of fungal etiology (keratomycosis) is very common and represents 30-40% of all cases of culture-positive infectious keratitis.[2,3] Moreover, fungi have replaced bacteria as the predominant cause of infectious keratitis in developing countries.[4,5,6] Studies performed in tropical and temperate climates show the rate of microbial corneal ulceration in a tropical climate to be 30 times that in the more temperate zone.[7] Since about half of these ulcers are fungal in tropical zones where the population is predominantly rural, and working in agriculture are clearly significant risks, possibly amplified by the lack of safety precautions in the less advanced agricultural societies.[3,8]In India, for example, a recent study suggests that approximately 1% of the population or around 9 million people will acquire microbial keratitis in

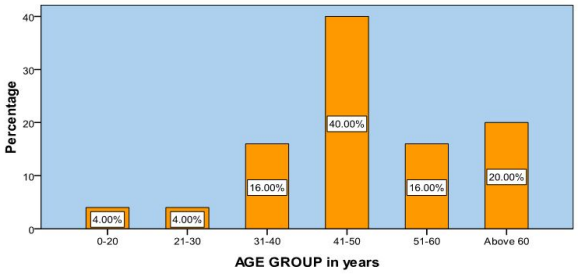
10 years and 50% of these cases will be fungal.[9] As epidemiology and aetiology of mycotic keratitis vary from region to region, and therefore, proper identification of aetiological agents are necessary for the institution of appropriate therapy. So the present study is taken up to assess the spectrum of mycotic keratitis in patients attending higher centre, Imphal by conducting microbiologic studies of the causative fungi so as to provide prompt and effective management of mycotic keratitis.

II. Materials And Methods

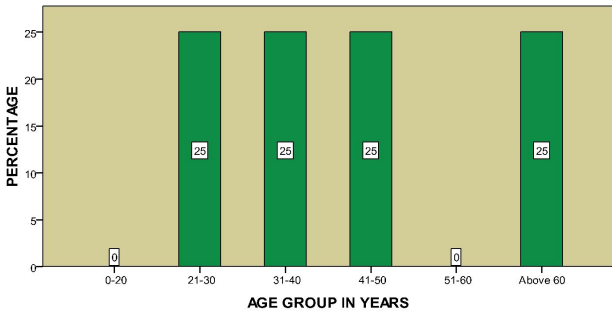
A cross sectional study was conducted in 25 patients with suppurative corneal ulcer attending to Ophthalmology Department in collaboration with Department of Microbiology, RIMS Hospital, Imphal, over a period of 2 years (October 2013 to September 2015). Patients presenting with typical features of viral keratitis, healing corneal ulcers, non-infective corneal ulcer and cases not willing to take part in the study were excluded from the study. A detailed history and a detailed clinical examination was carried out for each case with special attention to area and density of ulceration, size and depth of ulceration, size of epithelial defect, degree of stromal oedema, anterior chamber reaction, presence of hypopyon and presence of corneal vascularisation. Proper examination of the patient was done under the Slit Lamp Biomicroscope after staining the ulcer with fluorescein strips. Multiple scrapings were taken with the help of a sterile Bard Parker Blade No. 15 from the margin as well as the base of the ulcer under direct visualization through Slit Lamp. Four Specimens were collected and used for Gram's stain, 10% KOH Mount, Culture in Sabouraud's Dextrose Agar and Culture in Blood Agar.

III. Results And Observation

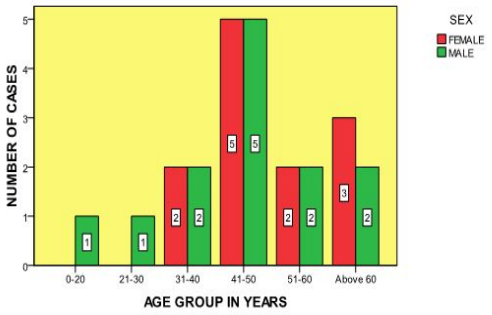
A total of 25 cases of suppurative corneal ulcer who attended the Department of Ophthalmology Regional Institute of Medical Sciences, Imphal, during the period from October 2013 to September 2015, were included in the study. Maximum number of patients were in the age group of 41-50 years, comprising 40 % of the total cases, followed by age group of above 60 years (20%). Highest incidence of mycotic corneal ulcer was found between 21-50 years of age. Males were only marginally more affected by corneal ulcer than females. Farmers were the most common occupational group affected by corneal ulcer (52%), followed by Housewives (16%). The maximum number of corneal ulcer patients attended RIMS during the months of November – December (52%), followed by March-April (20%) and January-February (12%). Paddy leaf injury was the most common agent causing injury to the eye resulting in corneal ulcer, constituting 36% of all the ocular trauma, followed by injury with other green leaves (16%) and bamboo stick (12%). 20% of the cases gave the history of topical application of Antibiotics only, 16 % both Antibiotics and Antifungal, 12 % only Antifungal, 8 % Corticosteroid and 12 % other drugs before attending higher centre. 72% of the patients had visual acuity greater than 3/60 at the time of presentation. About one third of the total number of cases showed the presence of hypopyon. Fungal hyphae could be detected in only 12 percent of the KOH Mounts. Fungal hyphae were detected in only 3 (12%) cases out of 25 cases on gram stain. Fungal growth could be noticed in 4 cases (16%) whereas in 84% of the cases, no organism could be isolated on SDA. 50 % of the isolated fungi from SDA culture were found to be Fusarium Spp. and the rest 50% comprises of Aspergillus Spp. and Scedosporium Spp.



BAR DIAGRAM SHOWING DISTRIBUTION OF CORNEAL ULCER IN DIFFERENT AGE GROUPS



BAR DIAGRAM SHOWING AGE DISTRIBUTION OF MYCOTIC CORNEAL ULCER



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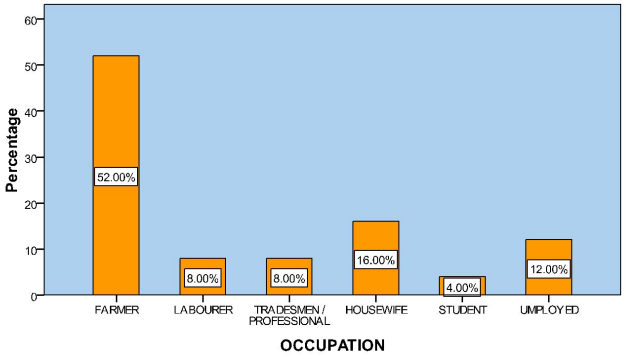
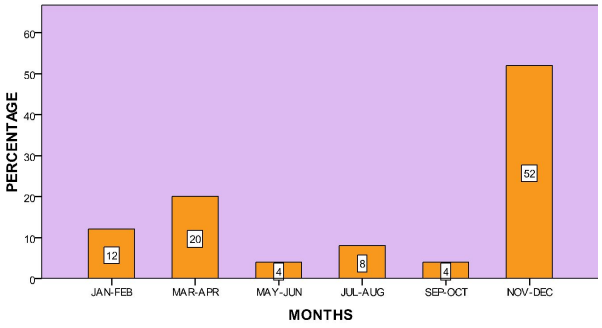


BAR DIAGRAM SHOWING OCCUPATIONS OF THE PATIENTS



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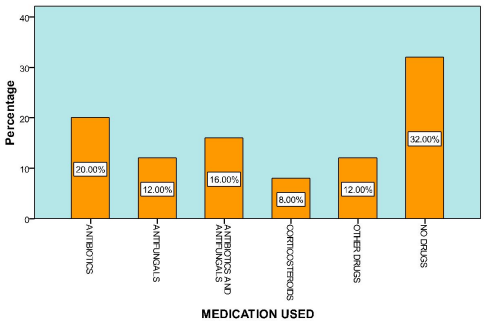

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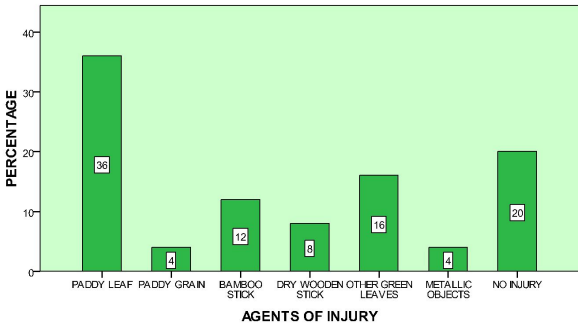
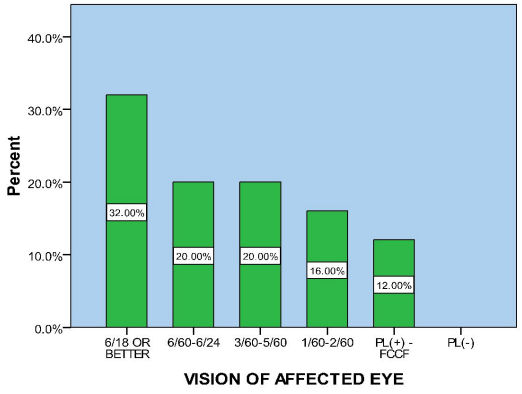


BAR DIAGRAM SHOWING AGENTS OF OCULAR INJURY CAUSING CORNEAL ULCER



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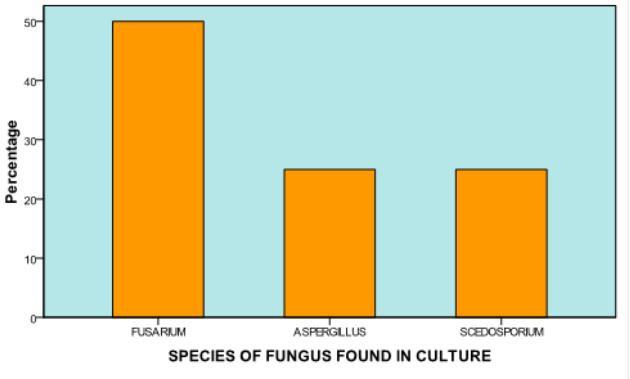
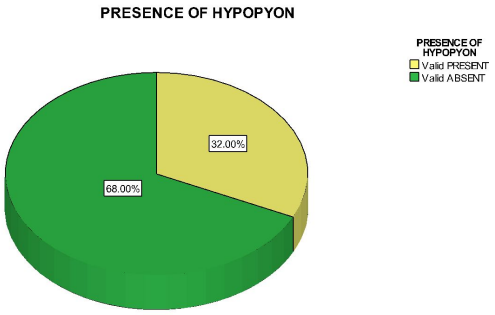
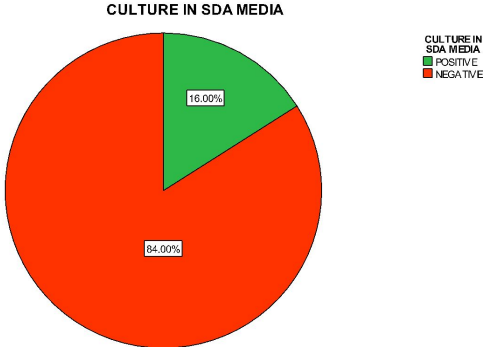


BAR DIAGRAM SHOWING FUNGAL SPECIES ISOLATED FROM CULTURE IN SDA MEDIA



PIE CHART SHOWING PRESENCE OF HYPOPYON



PIE CHART SHOWING RESULT CULTURE IN SDA MEDIA

IV. Discussion

Fungal keratitis has been an important cause of visual loss in many developing countries owing to its higher incidence in these regions as well as poor response to antifungals. Epidemiological patterns may vary from country to country and between different geographical regions of a country.[10] For more effective prevention and treatment of fungal keratitis, it is important for Ophthalmologists to be aware of regional epidemiologic features, risk factors, and etiologic data concerning this disease. In our present study, the ages of the patients were from 10 years to 75 years. The maximum number of patients was in the age group of 41-50 years, perhaps due to these age groups being maximally active outdoors.

Similar to our study, in 2011, Nath R et al[11] reported the highest incidence of corneal ulcer in the 41-50 years age group in Upper Assam. Chander Jet al[14] observed that maximum number of fungal corneal ulcers in Northern India were in the 51-60 year age group. In this study, corneal ulceration was slightly more common in males comprising 52% of the total cases as compared to females. The higher incidence rates seen in men in this study may be due to the higher risk of their exposure to injury during fieldwork compared to women. In the present study, 52 % of the corneal ulcer cases belonged to the occupational group of farmers, followed by housewives (16%), unemployed 14%, labourer 8%, tradesmen and professionals 8% and students 4%. Farmers comprised the most common group because they are more prone to injury by vegetative materials, especially, paddy leaves and stalk as compared to other occupational groups. In Upper Assam, Nath R et al[11] noted that 56.7% of corneal ulcer patients were tea-garden workers and 43.3% patients were rice-field workers. In our study, we found that 68% of the patients were using topical medications before or after occurrence of corneal ulcer, prior to attending higher centre, Imphal. Plain antibiotic eye drops being the most commonly used (20%), followed by antibiotic and antifungal eye drops (16%), antifungal (12%), other unknown eye drops (12%) and Corticosteroid Eye drop (8%). Bastola P et al[12] found that prior topical steroids use was 11.71%. Tahir FM et al[13] reported higher incidence of the use of topical steroids (17.02%).

In this study, the highest incidence of corneal ulcer was observed in the months of November-December, comprising more than half the cases (52%) followed by March-April (20%). This higher incidence in November-December can be explained by the fact that these are the harvesting period in Manipur and most of the corneal ulcers were caused through corneal injury by agricultural products. However, the incidence of corneal ulcer due to fungi was consistent throughout the year with no seasonal predilection.

Similar report was given by Leck AK et al[15], quoting that a significant increase in the number of reported cases of suppurative keratitis was observed during the harvesting period and windy seasons. However, the proportion of corneal ulcers due to fungi remained consistently high throughout the year. In our study, out of 25 cases, 20 patients (80%) gave history of trauma prior to development of corneal ulcer, 9 cases (36%) gave history of injury with paddy leaf, 4 cases (16%) with other green leaves and 3 cases (12%) with bamboo stick. Other traumatic agents are dry wooden stick, paddy grain and metallic objects. In this series, most of the patients presented with visual acuity ranging from 6/24-3/60 comprising 40% of the total cases, 32 % of the cases had visual acuity greater than 6/18 and 28% had visual acuity less than 3/60. Presence of hypopyon was observed in 1/3 of the cases (32%). In our study, KOH mounts as well as Gram's Staining were positive for fungal hyphae in only 12 % of the cases, only 4 patients had positive fungal growth in Sabouraud's Dextrose Agar, comprising only 16% of the total cases.

A possible reason for these negative cultures may be that patients were already on topical medication when they arrived at the hospital. Fusarium spp. was the most common fungal isolates comprising 50 % of the total fungi isolated from culture. Other fungi isolated were Aspergillus spp. (25%) and Scedosporium spp. (25%). In Western Maharashtra, Deorukhkar S et al[10] reported that Fusarium spp. was most commonly isolated (35.04%), followed by Aspergillus spp. (18.00%) among the fungal isolates.

V. Conclusion

In the present study, it was found that corneal ulcer was common in 31-60 years of age, with marginally higher incidence in male sex, mostly farmers by occupation and the most common cause of corneal ulcer was attributable to injury by paddy leaf during harvesting season, which falls in the months of November and December. About two thirds of the corneal ulcer patients were using topical medications prior to attending higher centre, Imphal. More than two-third of the patients presented with visual acuity better than or equal to 3/60 and one third with hypopyon. Of the total corneal ulcer patients, fungal etiology could be detected only in 16% of the cases, either through KOH mount, Gram's Stain or Culture in SDA. Fusarium constituted 50%, Aspergillus and Scedosporium 25% each as fungal species causing keratitis.

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