Original article

Pattern of fungal isolates in cases of corneal ulcer in the western periphery of Nepal

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Abstract

Purpose: To find out the epidemiologic features in 686 consecutive cases of fungal keratitis presenting in a tertiary eye hospital in the western region of Nepal.

Materials and methods: A prospective hospital - based study was carried out on 1880 consecutive patients presenting with corneal ulcer in the outpatient department and cornea clinic of Lumbini Eye Institute, Bhairawa, Nepal. The socio-demographic data, predisposing risk factors, prior treatment modalities, laboratory results and the distribution pattern of fungus species were analyzed.

Results: Diagnosis of fungus keratitis was established in 686 (36 %) out of the total study group of 1880 cases. The spectrum of fungi isolated were Fusarium species (Fusarium spp.) in 219 (31.9 %), followed by unidentified dematiaceous 151 (22 %), curvularia 122 (17.7 %) and unidentified hyaline in 111 cases (16.1 %). Men (59.3 %) were more commonly affected than women (40.6 %). The young adults age group of 31-40 years was most commonly involved (26.6 %). Corneal trauma (58 %) and topical steroids (12 %) were the most common predisposing risk factors noted.

Conclusion: In contrast to the other studies done in Nepal, we found Fusarium to be the most common fungal isolate causing corneal ulcer followed by unidentified dematiaceous, unidentified hyaline and curvularia. Corneal trauma was the commonest predisposing risk factor in causing fungal keratitis.

Keywords: cornea, fungal ulcer, fusarium, unidentified dematiaceous fungus

Introduction

Corneal ulcer is a disease that warrants special attention and intervention as it may lead to irreversible damage to the cornea in no time. Suppurative corneal ulcer is still one of the leading causes of blindness with an annual incidence of 799 cases per 1,000,000 population in Nepal, of which nearly 22 % are of fungal origin (Upadhyay et al 2001).

Trauma with vegetative matter leads to a higher risk of having fungal corneal ulcer. Also, the type of fungus commonly involved in the causation varies according to the geographic conditions. Some previous studies (Upadhyay et al 1988) have shown some specific pathogen in the mountainous region,

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but in the terai region no such etiological data are available. So we were in a need to gather valuable and specific background information related to the most common types of fungi involved in corneal ulcer cases in this region.

Materials and methods

A hospital-based, prospective, observational study was carried out with a primary objective to find out the distribution pattern of the most common fungi in cases of fungal corneal ulcer. All corneal ulcer cases attending the outpatient department and cornea clinic of Lumbini Eye Institute were considered as the study population for one-and-a-half year period starting from January 2006 to July 2007. This hospital is a tertiary eye centre and caters to patients from the western and mid-western regions of Nepal as well as from the neighboring Indian states of Uttar Pradesh and Bihar. Typical viral corneal ulcers, healing corneal ulcers, cases with mixed infections as well as non suppurative cases were excluded from the study along with cases showing a mixed kind of growth in culture media. A total of 1880 cases, after exclusion based on the above specified criteria, were evaluated in the outpatient department and cornea clinic, after which scraping was performed in the microbiological laboratory of the hospital. Corneal ulcer was defined as loss of corneal epithelium with clinical evidence of infection with or without hypopyon. After detailed slit-lamp bio-microscopic examination and fundus evaluation, the corneal ulcer was scraped using a flame-sterilized platinum Kimura spatula under a bio-microscope and in aseptic conditions. All cases were primarily stained with Gram and KOH stain, and the scraped material was put to chocolate agar, blood agar and brain heart infusion (BHI) broth. From the staining pattern and the presence of growth in different media, fungal cases were isolated, and after 24 hours only, fungus-positive cases were further put to Saboraud's dextrose agar (SDA) for a two-week period in order to isolate the fungus species. Cultures were considered negative if no growth was found after even 96 hours. The criteria for considering culture- positive cases were the following: growth of organism on more than one culture medium, or heavy growth on one liquid medium confirmed by smear. Identification of fungi in SDA medium was done by a trained microbiologist and a group of ophthalmologists.

The patients were asked to follow-up every 5 days for 3 weeks and then 2 weekly for 2 months, after which follow-up was individualized as per patient's requirements. However, because of the poor socioeconomic status and the low education level of most of our patients, the follow-up schedule was not strictly adhered to.

All the significant and positive findings were recorded and data was entered in the statistical package for social service (SPSS) data base version 11.o, and the results were interpreted.

Results

Out of 1880 cases, diagnosis of fungal keratitis was established in 686 cases (36 %). Out of these 686 cases, 407 (59.3 %) were male and 279 (40.6 %) were female. The age group of 31 to 40 was the one in which most cases of keratitis were recorded (183, 28 %) followed by 142 cases (20.6 %) in the age group of 21 to 30 years (Table 1).

Table 1

Distribution of age and sex among patients

Age group (years)	Male	Female	Total	Percentage
0-10	21	12	33	4.80 %
11 to 20	18	14	32	4.60 %
21 to 30	112	71	142	20.60 %
31 to 40	79	63	183	26.60 %
41 to 50	81	55	136	19.80 %
51 to 60	63	48	111	16.10 %
61 to 70	27	11	38	5.50 %
71 to 80	6	5	11	1.60 %
81 to 90		0	0	
Total	407 (59.3%)	279 (40.6%)	686	99.60

Predisposing risk factor was noted in 85 % of cases. A history of antecedent trauma was noted in 58 %. Previous topical corticosteroid use was noted in 12 % at the onset of keratitis (Table 2).

Table 2
Distribution of risk factors

Risk factors	No. of cases	Percentage n = 686
Trauma	397	58
Topical steroid	82	12
Chronic ocular surface disorder	41	6
Systemic disease	27	4
Contact lens wear	34	5
Total	581	85

These cases had more extensive infiltrates than those without prior corticosteroid use. Six percent of cases had chronic ocular surface disorders like dry eye, recurrent corneal erosion and atopic dermatitis. Systemic conditions with possible immune-suppression included diabetes mellitus and leprosy, and rheumatoid arthritis was noted in 4 % of cases.

Fusarium species was found in 219 (32 %) cases followed by unidentified dematiaceous in 151 (22 %) cases, curvularia species in 122 (18 %), and unidentified hyaline in 111 (16 %) cases. Cases of aspergillus species and candida species were 27 (7 %) and 19 (4 %) respectively (Table 3).

Table 3
Distribution of different type of fungi according to isolation in media

Fungus species	Total	Percent
Fusarium spp.*	219	31.90 %
Curvularia	122	17.70 %
Bipolaris	15	2.10 %
Aspergillus fumigatus	27	3.90 %
Aspergillus flavus	20	2.90 %
Unidentified dematiaceous	151	22 %
Unidentified Hyaline	111	16.10 %
Candida albicans	19	2.70 %
Aspergillus niger	0	
others	2	0.29 %
Total	686	

* Fusarium species

Table 3 shows the pattern of fungi isolated in the study; fusarium species being the commonest fungi isolated.

Table 4
Distribution of cases according to occupation of the patients

Occupation	Fungus	Percentage
Farmers	389	56.70 %
Housewives	123	17.90 %
Students	32	4.60 %
Office holders	12	1.70 %
Children	23	3.30 %
Labourers	19	2.70 %
Others	88	12.80 %
Total	686	

Fungal corneal ulcers were more common among farmers (55 % of cases), followed by housewives and others (17 % and 15 % respectively). Among other common occupational groups were students, children and office holders (Table 4).

Discussion

The commonest fungus isolated in our study is fusarium species in 32 % of cases, followed by unidentified dematiaceous species in 22 % and curvularia species in 18 % of cases. Our study correlates well with a similar study done in Ghana and southern India by Leck et al (2002) where 39.9 % of cases were due to fusarium species. The fusarium species are common plant pathogens particularly of cereal crops and saprophytes of plant debris and are found in soil. The higher incidence of fusarium species may be due to the widespread cereal-crop cultivation in this region. Curvularia species were found to be more prevalent in our study (18 %) than in the study of Leck at al (2002) in which the prevalence was 9.6 %.

In another study by Chowdhary et al (2005), aspergillus species were found to be the most common fungal isolate accounting for 41 % of cases.

Among them, aspergillus niger was the most common subspecies isolated. This finding is at variance with our study where 7 % of cases were due to aspergillus species and aspergillus niger was not found in a single case. In that study, fusarium species were detected in 12.5 % of cases which is also much lower than in our study.

The prevalence of fungal keratitis in our study is 36 % and this data is in concordance with a similar study by Chowdhary et al (2005) where 39 % of cases were found to be of fungal origin, and with another study, by Sandhu et al (1981), which demonstrated that 32 % of cases were of fungal origin.

An interesting fact noted in our study is the high prevalence of unidentified dematiaceous and hyaline species. Dematiaceous species were diagnosed on the basis of the brown pigmentation and hyaline species growth presented as whites colonies.

Chowdhary et al (2005) has documented an increased incidence of mycotic ulcer in the months of September and October though in our study the prevalence was observed to be relatively the same throughout the year. This fact is similar to the study done in South India and Ghana where no significant seasonal variation in incidence of fungus ulcer was noted.

The frequency of mycotic ulcer was greater in men than in women. The incidence of corneal ulcer was found to be more among farmers and housewives in our study which can be again attributed to agricultural work in both sexes and the inability of most women of this region to access medical services. This fact correlates well with a previous study done in Nepal by Upadhyay (1988) where 49.6 % of affected patients were farmers and 22.5 % were housewives compared to the 55 % and 17 % in the respective groups in our study.

The most common predisposing factor found in our study was corneal injury, in 58 %. This figure has been echoed by another study by Srinivasan et al (1997). The agents responsible for this trauma were primarily agricultural matter such as rice stalks, thorns, tree branches and leaves and paddy grain. Animal products commonly implicated in corneal injury were the tails of cows and cow dung. In another similar study by Chowdhary et al (2005), trauma was found in 42 % of cases, being the commonest predisposing factor, though in this study, contact lens wear was significantly implicated as a risk factor in 20 % of cases while in our study, it accounted as a risk factor in 5 %. This may be due to the poor socioeconomic background of our patients.

The present study showed that corneal ulcers were encountered in all age groups but the prevalence was highest (84 %) between 21 to 60 years of age and least in the extremes of age. Also, the prevalence was highest (28 %) among patients between 31 to 40 years. Among children below ten years, the prevalence was 5 % - a factor which may be attributed to less outdoor activities among the children. This observation correlates well with the study by Chowdhary et al (2005) where 37 % of cases of mycotic ulcer involved the same age group of 31 – 40 years. It is definitely interesting to note that as the young people are more affected, it may cause a greater socioeconomic consequence. On the other hand, we noticed a very small prevalence among the age group of 71 – 80 years (1.6 %). This may be due to the fact that older people are dependent on others for health care. Due to the popular belief that treatment would require repeated hospital visits and hospitalization, many cases may have been underreported to our referral centre.

The percentage distribution patterns of fungal ulcers were 36 % while purely bacterial ulcers were 64 % in our study. The prevalence of fungal ulcers in our study is greater than the overall prevalence (22 %) in the whole of Nepal (Upadhyay et al 1982), though it is in accordance with the prevalence of the South Asian countries, where it has been depicted as nearly 33% by Maung et al (2006).

Conclusion

In contrast to the other studies done in Nepal, we found fusarium to be the most common fungal isolate causing corneal ulcer followed by unidentified dematiaceous, unidentified hyaline and curvularia respectively. Corneal trauma was the commonest predisposing risk factor in causing fungal keratitis. To develop a comprehensive strategy for diagnosis and treatment, it is useful to know the local etiology of a particular region. This is important regarding the management, as many eye centers don't have microbiology laboratories and identification of fungus may have to be done on purely clinical and background informational basis.

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