ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 05 | May - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EPIDEMIOLOGY OF FUNGAL KERATITIS IN NORTH KARNATAKA REGION

Ophthalmology

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ABSTRACT

Background: In India, the incidence of fungal keratitis ranges from 44% to 47% , due to its tropical environment and huge at-risk agricultural population. The majority of people in North Karnataka are farmers by occupation. **Aim & Objectives:** To assess the epidemiology of fungal corneal ulcers in north Karnataka. MATERIALS & METHODS: It is a cross-sectional study of 1 year duration with 52 KOH mount positive and fungal culture positive patients. A complete ophthalmic examination, including best-corrected visual acuity, slit-lamp examination, fluorescent staining. Relevant investigations like random blood sugar, corneal scraping sent for 10%KOH Mount and fungal cultures with Sabouraud's Dextrose Agar (SDA) **Results:** 52 KOH mount and fungal culture positive patients were included , with mean age of 50.88 years. 53.8% were farmers. 81% were illiterate. 55.6% had a history of trauma with organic matter. The common signs noted were ciliary congestion, irregular, dry looking, central corneal ulcer measuring 2-5mm extending 20-50% deep, mid stromal infiltration, satellite lesions and surrounding stromal oedema. 11 presented with perforation. The best corrected visual acuity was hand movements (32.7%). The KOH mount positive among the screened patients were 46.7%, of which 52 were culture positive. Aspergillus fumigatus (61.5%) was the predominant cause of mycotic keratitis. **Conclusion:** Filamentous fungi majorly contributed to mycotic keratitis and associated with poor visual prognosis, mostly seen among farmers.

KEYWORDS

Fungal Keratitis, Endothelial Plaques, Agriculture

INTRODUCTION

Blindness due to corneal pathologies ranks 4th in the world, after cataract, glaucoma, and age-related macular degeneration (ARMD), with a prevalence of 5.1%. 1.5- 2 million new cases of corneal ulcers are recorded every year establishing a major public health problem according to WHO reports [1]. Over 6.8 million Indians suffer from corneal blindness. [2]. Hence, it is rightfully termed as a "silent epidemic," imposing a heavy financial burden on the healthcare system, especially in developed countries[3]. The second most significant global contributor to infectious blindness is a corneal ulcer. Additionally, it is the leading contributor to ocular morbidity and visual impairment in developing nations.

Fungal keratitis is a serious condition for which diagnosis might be difficult [4]. It is ubiquitous in tropical areas. In India, the incidence varies between 44% and 47% with fungal corneal ulcers being frequent in numbers [5]. If left untreated fungal keratitis can result in severe complications, like a corneal abscess, perforation and corneal scaring, finally resulting in blindness [6]

Rural areas of India, where the majority of the population are farmers by occupation and are prone to accidental trauma to the cornea. In this region of North Karnataka, being a predominantly agricultural population, the risk of corneal injury is high, so it risks developing fungal keratitis [7]. Therefore, prompt diagnosis is necessary to provide evidence-based guidance for the successful empirical management of fungal keratitis.

MATERIALS AND METHODS

This cross-sectional, time-bound study was executed on patients who visited the tertiary centre of Vijayapur, during the period of JANUARY 2021-JULY 2022 [18 months]. Ethical approval was obtained by the Institutional Ethical review board -BLDE(DU)/IEC/09/2021-22. 147 patients were screened out of which a total of 52 patients with both KOH mount and fungal culture-positive patients, coming to the outpatient and inpatient department, were enrolled in the study. They were included only after the complete clinical and microbiological diagnosis of mycotic corneal ulcer. The patient's written informed consent was obtained. They were screened by complete ophthalmic examination, including detailed History that included questions about their demographics, occupation, the types and duration of their symptoms, their nature, any prior trauma to the eye, their nature, and any systemic comorbidities. Complete ophthalmic examination like visual acuity, Slit lamp biomicroscopy, to assess the anterior segment and Lacrimal syringing was performed to rule out chronic dacryocystitis.

Corneal scraping and smear preparation[8] under topical anaesthesia by using the specimen-15 no. surgical blade/ 26 ½ gauge needle over glass slides, KOH wet mount preparation was done along with samples inoculated in sabourauds dextrose agar plates which was observed for 1month for growth

The patients included in this study were both KOH mount and culture positive for fungal elements, whereas patients with bacterial keratitis, viral keratitis,mooren's keratitis, marginal keratitis, neurotropic keratitis, autoimmune mediated keratitis and interstitial keratitis were excluded.

RESULTS

A total of 147 patients screened out of which 52 patients were KOH mount and culture positive, were enrolled in the study. Written informed consent was taken from all of them. Around 32.7% of patients were in the range 50-59 years indicating that ages beyond 50 years are more prone to fungal keratitis. In the study, males were affected more (57.7%) when compared to females (42.3%) (TABLE1). Most of the patients (53.8%) were farmers by occupation, indicating farmers are at high risk of fungal keratitis, followed by homemakers. Drivers, mechanics and students also contributed to its aetiology (FIGURE 1). Among the study group, 81% were illiterate indicating that literacy is associated with fungal keratitis. 60 % gave a history of trauma, thus indicating trauma is most commonly associated with fungal keratitis. Among them, the majority of the traumatic agent were plant stems (55.8%) followed by (23.1%) animal tail.9.6% were unaware of the agents. Therefore trauma with organic substances are more prone to develop fungal corneal ulcers(TABLE 1). Out of the 52 patients, the majority presented with BCVA of hand movements indicating that fungal keratitis with poor visual acuity at presentation.10 out of 52 were diabetic (19.2%), 3 out of 52 were hypertensive (6%) showing no significant association with fungal keratitis. Among 52 patients, 30 patients had no adnexal infection, whereas, among the remaining 22, 13.5% had chronic dacryocystitis followed by stye (11.7%), indicating orbital infections also contribute to fungal keratitis. (TABLE 1). 46 out of 52 cases complained of pain,

and 44.2% presented with symptoms of pain, pricking sensation, photophobia, blurring of vision, redness and watering.10 out of 52 presented with perforation at consultation. The common features noted under slit lamp biomicroscopy were ciliary congestion (71.2%), irregular (69,2%), dry looking (84.6%), central corneal ulcer (61.5%) measuring 2-5mm (75%) extending 20-50% deep (78.8%), with mid stromal infiltration (51.9%) with feathery margins (71.2%) and satellite lesions (61.5%) and surrounding stromal oedema (51.8%). 15.4% had an immune ring. 14 out of 52 had hypopyon. 51.9% had an endothelial plaque. The 52 patients which were KOH mount and culture positive for fungal elements were included in the study, the majority of fungi were aspergillus fumigatus (62%) followed by aspergillus flavus (15%). 2% of cases were candida and dematiaceous fungi respectively. 10% were aspergillus niger and fusarium respectively (FIGURE 2).

Table 1 Demographic Details

AGE	MEAN: 50.88 years	RANGE: 50-59 years
GENDER	MALE: 48%	FEMALE : 52%
ILLITERACY	ILLITERATES: 81%	LITERATE: 19%
SYSTEMIC COMORBIDITIES	DIABETES: 19%	HYPERTENSION: 6%
MODES OF TRAUMA	PLANT STEM: 55.8%	ANIMAL TAIL: 23.1%
ORBITAL INFECTIONS	CHRONIC DACRYOCYSTITIS: 13.5%	STYE: 11.5%

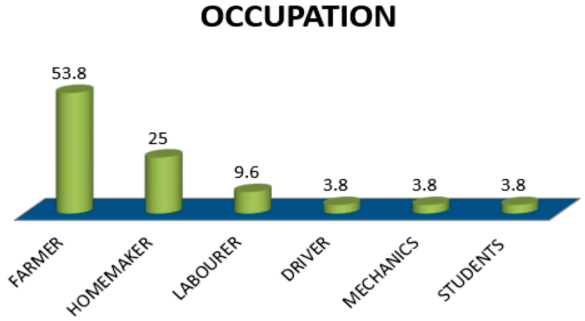

Figure 1: Graph showing various occupation owned by the patients in this study

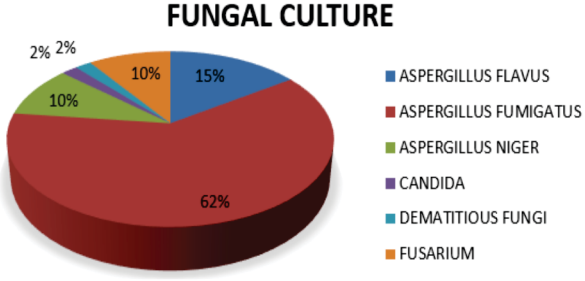

Figure 2: showing various fungal species obtained during the study

DISCUSSION

Fungal keratitis is one of the main reasons for vision loss in underdeveloped nations is fungal keratitis[9]. In these infections, treatment success may be lower resulting in poor visual outcomes due to challenges in mycological and clinical diagnosis and the ineffectiveness of antifungal medications[10]. Socioeconomic makeup, climate, and environmental factors influence the occurrence of fungal keratitis in different regions[11]. A significant number of cases of microbial keratitis are caused by fungi, particularly in hot, humid regions and in locations with large populations of agricultural workers[12]. Chittur. Y. Ranjini et al. in her study found that (61.5%) male developed microbial keratitis. The age range of 41-60 years was the most affected group. In our study. we discovered that 57,7% of the patients were men and that the bulk of them was in the 50- to 59-year age range. This might be a result of men contributing to the substantial agricultural labour force in society. The majority of them were farmers (53.8%) and illiterates (80.8%).Al-Badriyeh et al. discovered that concurrent ocular illnesses, extended use of corticosteroids, incorrect use of antifungal drugs, and corneal damage with vegetative matter were further risk factors for keratitis. According to Mravii et al., a corneal infection begins when the epithelial integrity is compromised, either as a result of trauma or an ocular surface condition, and fungi gain access to the tissues, multiply, and trigger a strong inflammatory response that may result in stromal necrosis[13,14]. Similar to the above studies we found that 59.6% of patients were predisposed to trauma majority of which had trauma with vegetable matter (55.8%) followed by animal matter (23.1%), insect (7.7%) and metallic piece (3.8%).According to a study by W. Zbiba, in addition to ocular damage, other risk factors for fungal keratitis include diabetes, contact lens use, and corticosteroid use[15]. In our study, we found that hordeolum (11.5%), and chronic dacryocystitis, (13.5%) were some of the predisposing factors associated with fungal keratitis. In the Namperuvalsamy v prajna et al study, patients with fungal keratitis had vision worse than 20/400[16]. The majority of the patients in our study (32.7%) had visual acuity of hand movements at the consultation. Overall the vision of the presentation was poor. This is mainly because of late presentation because of illiteracy and usage of occult vegetative oils. The common symptoms presented in our study were pain, pricking sensation, photophobia, blurring of vision, redness and watering (44.2%). 32.7% presented with signs of lid oedema, conjunctival congestion, epithelial defect with infiltration and cataract. 11 out of 52 presented with perforation at consultation. According to a study by Mahmoudi, the earliest indications of fungal keratitis are a corneal infiltration with feathery borders, a dry, elevated necrotic surface, and maybe satellite lesions[17]. Hypopyon, neovascularization, deteriorating corneal opacity, and corneal perforation are symptoms that may be seen if the infection is not treated[18].Perforation is most commonly seen in patients with bacterial keratitis, but our study found 11 patients with perforated fungal keratitis which was statistically significant A study by Manisha acharya found that bacterial culture accounted for 60.6% (238/393) and fungal cultures were 143 (36.4%)[19]. The common filamentous organisms found in this study were Fusarium species 17.7% and Aspergillus species 16.1%, whereas the most common yeast was Candida 24.2%. The use of contact lenses was found to be the main predisposing factor in keratitis by filamentous fungi. Immunocompromised host and ocular surface disease were associated with keratitis by yeasts[20].In our study, we found that the majority of fungal keratitis were culture positive for filamentous fungi like aspergillus fumigatus (62%). This highlighted that the north Karnataka region, being densely populated by people who have agriculture as their source of income is predisposed to trauma, hence more prone to develop filamentous fungal keratitis. Therefore it is of utmost necessity to create awareness among the rural population especially farmers about this vision-threatening condition and should be counseled about the need to wear protective glasses while working, to report immediately following trauma and be compliant with the medications advised by the ophthalmologists. The small sample size, inability to capture the and follow up of the cases for the progression of the disease were the few limitations that were encountered in this study.

CONCLUSIONS

Fungal keratitis is an aggressive disease with a poor visual prognosis. It is more prevalent in areas where agriculture is the source of livelihood. In this part of north Karnataka, filamentous fungi were found to be more prevalent with male preponderance and risk factors being older age, trauma to the eye with a vegetative matter in the fields, illiteracy, and chronic dacryocystitis. 10% KOH Mount was found to be very useful in the rapid diagnosis of fungal keratitis. Corneal blindness can be prevented in large part by raising public awareness of proper eye hygiene and the use of protective glasses. .

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