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Original Research Paper

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USE OF ANTERIOR SEGMENT OPTICAL COHERENT TOMOGRAPHY IN FUNGAL KERATITIS IN COVID 19

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ABSTRACT

BACKGROUND: In India, the incidence of fungal keratitis ranges from 44% to 47%. Newer modalities are needed to improve detection and to monitor the disease in COVID 19 period **AIM & OBJECTIVES:** To assess the use of anterior segment optical coherent tomography tomography (AS-OCT) in fungal keratitis **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 corneal scraping sent for 10%KOH Mount and fungal cultures with Sabouraud's Dextrose Agar (SDA), ASOCT **RESULTS:** 52 KOH mount and fungal culture positive patients were included,with mean age of 50.88 years. 53.8% were farmers. 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. 26 patients had endothelial plaques and 16/26 were detected by AS-OCT that was statistically significant. **CONCLUSION:** Anterior segment optical coherence tomography is a non invasive in detecting the endothelial plaque and monitor the infiltrate size. Therefore, can be used as an adjunct in the management of fungal keratitis.

KEYWORDS : FUNGAL KERATITIS, ENDOTHELIAL PLAQUES, ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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%,establishing a major public health problem according to WHO reports (1). Hence, it is rightfully termed as a "silent epidemic," imposing a heavy financial burden on the healthcare system, especially in developed countries(3). Additionally, it is the leading contributor to ocular morbidity and visual impairment in developing nations.

Fungal keratitis is ubiquitous in tropical areas. In India, the incidence varies between 44% and 47% with fungal corneal ulcers being frequent in numbers (5), which if left untreated can result in severe complications, like a corneal abscess, perforation and corneal scaring, finally resulting in blindness (6)

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).

The COVID-19 pandemic took a toll on the poor healthcare infrastructure in India. Many regular outpatient departments were cut off and the major focus and manpower were allotted towards COVID-19 patients. Although emergency facilities were available, that didn't prevent the worsening of vision in corneal ulcer patients, as these patients need utmost attention and early management.

Therefore, newer non invasive modalities are needed in the 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. 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. The eyes with fungal keratitis were imaged by using non-invasive optical coherence tomography specialized for anterior segment scans with optical resolution- 5 m vertical and 15 m horizontal scans using the Cornea Cross Line model. The major goal was to determine whether there was a distinct or wavy border to distinguish the endothelial plaque from the endothelial cells of the cornea to focus on the interaction between them, and also to measure the size of the infiltrate. The patient is asked to sit in front of the machine and rest the chin and forehead on the given slot provided and asked to look straight into the machine to observe the green light, the position of the patient has adjusted accordingly and the scans are obtained (10).

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

The study included 52 patients that 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. Among the study group, 81% were illiterate indicating that literacy is associated with fungal keratitis. 60 % gave a history of trauma, thus indicating trauma with organic substances is 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%), Among 52 patients,13.5% had chronic dacryocystitis followed by stye (11.7%), indicating orbital infections also contribute to fungal keratitis. (TABLE 1). 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. 78.8% stromal infiltrates could be measured using ASOCT. 51.9% had an endothelial plaque which were detected under ASOCT which was statistically significant p value(<0.001). 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 1). The endothelial plaques were most commonly associated with aspergillus and fusarium species.

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%

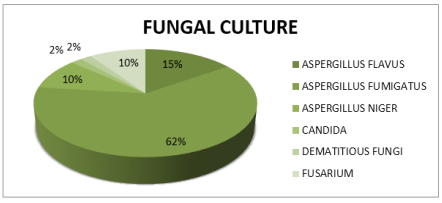

FIGURE 1 : showing various fungal species obtained during the study

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). The presence of the COVID-19 pandemic made it even harder for these patients to gain access to medical management. 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%). 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%). 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 the COVID-19 pandemic, illiteracy and usage of occult vegetative oils. The common signs presented in our study were (32.7%) lid oedema, conjunctival congestion, epithelial defect with infiltration and cataract. 11 out of 52 presented with perforation at consultation.Perforation is most commonly seen in patients with bacterial keratitis, Perforation is most commonly seen in patients with bacterial keratitis, but due to the presence of the COVID-19 pandemic, the patients were unable to gain access to the medical facility in time. Therefore our study found 11 patients with perforated fungal keratitis which was statistically significant. In a study by jin min et al endothelial plaque occurs due to damage to the endothelium as the fungal elements enter through the stromal layer into the (AC) anterior chamber, which is a crucial indicator in mycotic keratitis, which is associated with the diagnosis, surgical indications, and prognosis. They also found that endothelial plaques were associated with bacterial keratitis more than mycotic keratitis (10). According to Clemence Bonnet et al, Anterior segment optical coherence tomography can be instrumental in evaluating the range of reactions in the eye disorders in individuals with keratitis. Another study by Takezawa et al. documented 5 of 6 cases of fungal keratitis having an indistinct boundary of the plaque from the endothelium, and they also noted that there was an extension of hyper-reflective areas of plaque beyond the corneal ulcer. They used ASOCT to identify endothelial plaques in an individual diagnosed with mycotic keratitis (26). The endothelial plaques were seen in 27 patients which were screened under ASOCT in our study. 16 of those cases revealed hyper-reflective lesions with a distinct separation of the plaque from the endothelial cells. In the rest of the 11 cases, it was difficult to differentiate as the corneal ulcer was deeper and more aggressive. Despite these disadvantages, the screening of endothelial plaque under ASOCT was proved to be statistically significant p(0.0001) thus showing that ASOCT can be used as an adjunct in monitoring the disease progression. In our study, we found that the majority of fungal keratitis were culture positive for filamentous fungi like aspergillus fumigatus (62%). 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. Due to the COVID-19 pandemic, the incidence of perforated fungal keratitis was significant. Anterior segment optical coherence tomography was a non-invasive and feasible tool to assess the cornea during this pandemic. It can be instrumental in monitoring the progression of the disease.

REFERENCES:

1. Ranjini CY, Waddepally VV. Microbial profile of corneal ulcers in a tertiary care hospital in South India. Journal of ophthalmic & vision research;2016.11(4):p.363.
2. Vasudha CL, Anuradha B, Krishna BN. A study on the mycological profile of corneal ulcers in a tertiary care hospital. Indian J Microbiol Res;2019.6(1):p.1-5.
3. Mohammad ZA, Torbati Pm, Asadi-Amoli F, Talebnejad M, Parvizi M, Nasiri Z, Gharebaghi R, Heidary F. Microbiological Profile of Corneal Ulcers at a Tertiary Referral Center. Medical Hypothesis, Discovery, and Innovation in Ophthalmology; 2019.8(1):p.16.
4. Keay LJ, Gower EW, Iovieno A, Oechsler RA, Alfonso EC, Matoba A, Colby K, Tuli SS, Hammersmith K, Cavanagh D, Lee SM. Clinical and microbiological characteristics of fungal keratitis in the United States, 2001–2007: a multicenter study. Ophthalmology;2011.118(5):p.920-6.
5. Punia RS, Kundu R, Chander J, Arya SK, Handa U, Mohan H. Spectrum of fungal keratitis: a clinicopathologic study of 44 cases. International journal of ophthalmology; 2014.7(1):p.114.
6. Pereira LA, Foschini RA. Correlation between pathogenic species and clinical findings, disease severity, and visual outcome in patients with fungal keratitis. Arquivos Brasileiros de oftalmologia; 2019.82(1):p.2-5.
7. Waghmare AS, Sadanand PK. Clinical and microbiological profile of infective keratitis and their antibiotic sensitivity. Indian Journal of Microbiology Research; 2019.6(1).
8. Basheer N. Scraping in corneal ulcers. Kerala J Ophthalmol 2020;32:97-101
9. Sekeroğlu HT, Yar K, Damar E, Uğuz A, Yağmur M, Ersöz TR, Kibar F. Cytologically Diagnosed Fungal Keratitis: Clinical Features and Treatment Results. Turk J Ophthalmol. 2010;40:255-9.
10. Ghosh AK, Gupta A, Rudramurthy SM, Paul S, Hallur VK, Chakrabarti A. Fungal keratitis in North India: spectrum of agents, risk factors and treatment. Mycopathologia. 2016 Dec;181(11):843-50.
11. Chowdhary A, Singh K. Spectrum of fungal keratitis in North India. Cornea. 2005 Jan 1;24(1):8-15..
12. Al-Badriyeh D, Neoh CF, Stewart K, Kong DC. Clinical utility of voriconazole eye drops in ophthalmic fungal keratitis. Clinical Ophthalmology (Auckland, NZ). 2010;4:391.
13. Mravičić I, Dekaris I, Gabrić N, Romac I, Glavota V, Mlinarić-Missoni E. An overview of fungal keratitis and case report on trichophyton keratitis. Keratitis. 2012 Apr 25:1-4.
14. Zbiba W, Baba A, Bouayed E, Abdessalem N, Daldoul A. A 5-year retrospective review of fungal keratitis in the region of Cap Bon. Journal francais d'ophtalmologie. 2016 Dec 1;39(10):843-8
15. Prajna NV, Krishnan T, Rajaraman R, Patel S, Srinivasan M, Das M, Ray KJ, O'Brien KS, Oldenburg CE, McLeod SD, Zegans ME. Effect of oral voriconazole on fungal keratitis in the mycotic ulcer treatment trial II (MUTT II): a randomized clinical trial. JAMA ophthalmology. 2016 Dec 1;134(12):1365-72.
16. Mahmoudi S, Masoomi A, Ahmadikia K, Tabatabaei SA, Soleimani M, Rezaie S, Ghahvechian H, Banafsheafshan A. Fungal keratitis: An overview of clinical and laboratory aspects. Mycoses. 2018 Dec;61(12):916-30.
17. Erdem E, Yagmur M, Boral H, Ilkit M, Ersoz R, Seyedmousavi S. Aspergillus flavus keratitis: experience of a tertiary eye clinic in Turkey. Mycopathologia. 2017 Apr;182(3):379-85.
18. HAHN YH, LEE DJ, KIM MS, CHOI SH, KIM JD. Epidemiology of fungal keratitis in Korea: a multi-center study. Journal of the Korean Ophthalmological Society. 2000:1499-508.
19. Acharya M, Farooqui JH, Gaba T, Gandhi A, Mathur U. Delhi infectious keratitis study: Update on clinico-microbiological profile and outcomes of infectious keratitis. Journal of Current Ophthalmology. 2020 Jul;32(3):249.
20. Menard M, Shah YS, Stroh IG, Zafar S, Sriparna M, Zhang N, Agarwal AA, Shekhawat N, Srikumaran D, Woreta F. Microbial Profile and Clinical Outcomes of Fungal Keratitis at a Single-Center Tertiary Care Hospital [Corrigendum]. Clinical Ophthalmology. 2022 May 30;16:1639-40.