Study on Clinicomicrobiological Profile in Keratomycosis

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Abstract: _Introduction: Keratomycosis is a major cause of infectious keratitis having a worldwide distribution from 17%-36%. Aim: This prospective study was undertaken to evaluate the clinicomicrobiological aspects and epidemiological characters of keratomycosis. Materials and Method: Sixty microbiologically confirmed cases of keratomycosis were taken for study out of seventy suspected cases. Patients were subjected to detail history and comprehensive ocular examination and findings recorded. After taking corneal scrapping, microscopic examination was done on KOH wet mount to find out the fungal elements and culture was performed to look for fungal growth and to identify the species. Results: There were male preponderance with 63.33% incidence and females were with 36.67%. Keratomycosis was most prevalent in age group between 41-50 Years (36.67%)and history of trauma was encountered in 53.33%. Most common traumatic agent was vegetable material (37.50%) and among other predisposing factors, use of topical steroid was mostly found (26.67 %.) Farmers are the commonest victims (40%) and incidence in rural people are very high (83.33%). Most patients presented in between 11-30 days (46.67%) and 73.30% of patients had vision less than 6/60. Most common clinical presentation was ulcer with epithelial lesion. In all cases, fungal elements were detected and culture test was also positive in all cases. Aspergillus was detected in maximum cases (66.67%). Conclusion: Keratomycosis is a leading and challenging cause of uniocular morbidity and blindness. Appropriate and effective management is needed for better prognosis._

Keywords: Keratomycosis, Traumatic agent, KOHmounting, fungal element, culture test, aspergillus

1. Introduction

Keratomycosis represents one of the major causes of infectiouskeratits that has a worldwide distribution ranging from 17-36%. Regional distribution of corneal ulcers in India is 7.3 in Northern India, 32% in East India, 38.9% in West India and 32-39.8% in Southern India [1], [2]. This fungal lesion of cornea can lead to serious painful ocularmorbidity and devastating visual outcome. It was Leber who reported the first case of fungal keratitis in 1879 and since then, there have been an increasing number of fungal keratitis cases [3]. As regards the aetiological and epidemiological pattern of corneal ulceration, it varies significantly with the patient population, health of the cornea, geographical region, and also tends to very with period of time [4]. Corneal trauma has been listed as the most common risk factor for mycotic keratitis in most of the studies. Other predisposing factors could be prolonged use of topical corticosteroids or anti-microbial agents, systemic diseases such as diabetes mellitus, pre-existing ocular diseases and use of contact lens [5]. It has also been noted that ocular morbidity in mycotic infection tends to be higher compared to bacterial keratitis and it is because of the fact that diagnosis is often delayed due to negligence towards ocular trauma, inappropriate treatment and wide spread use of topical antibiotics and steroids for any case of corneal ulcer [6]. Moreover, fungi have replaced bacteria as the predominant cause of infectious keratitis in developing countries [7], [8].

Keratamycosis is most commonly caused by yeast and filamentous fungi which is further classified into two types: pigmented (dematiaceous) fungi which produce characteristics black/brown pigment and non-pigmented (moniliaceous) fungi which do not produce such pigments [7]. Across the world, the single most commonly reported fungus isolated from mycotic keratitis is Aspergillus species [10]. In India, a greater number and diverse em—atiaceous moulds were cultured in which Curvularia species were most frequently isolated [11]. It is worth mentioning here that it is sometimes not reliable to diagnose oculomycosis on the basis of clinical features as it cannot distinguish it from other microbial infections because of overlapping clinical features[12]. As such using characteristic clinical features together with microbiological investigation is very important in establishing a tentative diagnosis of oculomycosis [13].

2. Materials and Methods

This prospective study was undertaken among sixty microbiologically confirmed fungal corneal ulcer cases out of seventy clinically suspected cases of Keratomycosis. Ten cases which did not show fungal element on KOH staining and with no fungal isolate in culture were excluded from the study.

It was conducted to evaluate the clinicomicrobiological aspects and epidemiological pattern of fungal keratitis. Cases were seen at the outpatient department of Regional Institute of Ophthalmology, Gauhati Medical College, Guwahati. Patients were enrolled for study after obtaining written informed consent. Patients were subjected to detailed history and clinical ocular examination. The history comprised of occurrence of any ocular trauma, nature of traumatic agents, other predisposing factors, occupational status of the patients, their living condition and time of presentation at our hospital. Visual acuity was recorded by snellen's chart and patency of lacrimal passage was tested by syringing and this was followed by slit lamp biomicroscopy.

Thereafter, corneal scraping from the leading edge and base of the ulcer was taken under topical anaesthesia and under all aseptic precautionary measures. The samples were sent to the microbiological unit of our Regional Institute of Ophthalmology immediately. Direct microscopic examination of corneal scrapings was performed with 10% KOH wet mount for demonstration of fungal element. At the same time another portion of corneal scrapings was inoculated on chocolate agar and sabouraud's dextrose agar (SDA). Chocolate agar was incubated aerobically at 37° C. They were examined daily and discarded after 7 days if no growth was noticed. SDA was incubated at 25° C and 37° C for a period of 4 weeks. The media was examined for any fungal growth every day in the first week and twice a week for the next three weeks. Any fungal growth seen was identified by standard fungal identification technique and finding was recorded carefully. From the character and pattern of the colonies and after staining from the growth and with some biochemical tests, the various species of the fungus were identified.

3. Results and Observations

(1) Gender distribution of Keratomycosis

Table 1: Gender distribution

Gender	Number	Percentage
Male	38	63.33%
Female	22	36.67%
Total	60	100%
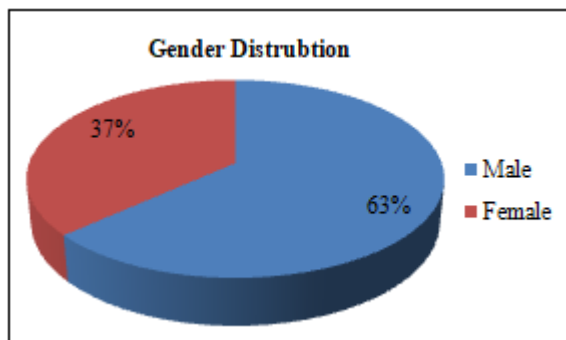
Figure 1

(2) Age wise distribution of fungal corneal ulcer

Table 2: Age distribution

Age group in years	Number	Percentage
0-10 years	2	3.33%
11-20 years	4	6.67%
21-30 years	2	3.33%
31-40 years	10	16.67%
41-50 years	22	36.67%
51-60 years	10	16.67%
61-70 Years	6	10%
71-80 years	4	6.67%
Total	60	100%

(3) History of trauma

Table 3: Trauma

History of trauma	Number	Percentage
Present	32	53.33%
Absent	28	46.67%
Total	60	100%

(4) Traumatic agents involved in Keratomycosis

Table 4: Traumatic agents

Traumatic Agents	Number	Percentage
Sand/dust/cement	8	25%
Wood/bamboo Stick	4	12.50%
Leaf /Thorn	4	12.50%
Vegetable materials	12	37.50%
Cow's /Horse's tail	2	6.25%
Limestone	0	0
Finger nail	2	6.25%
Total	32	100%

(5) Presence of other predisposing factors involved in Keratomycosis:-

Table 5: Predisposing factors

Predisposing factors	Number	Percentage
Topical steroid	8	26.67%
Excessive use of antibiotics	4	13.33%
Use of traditional eye medicine	5	16.67%
Chronic Dacryocystitis	5	16.67%
Dry eye	2	6.67%
Diabetes	6	20%
Total	30	100%

(6) Occupational status of the patient:

Table 6: Occupation

Occupational status	Number	Percentage
Agriculture	24	40%
Manual Labour	12	20%
Household activities	20	33.33%
Student	2	3.33%
Unknown	2	3.33%
Total	60	100%

(7) Living condition of the patients (hailing place/ inhabitant area):

Table 7: Inhabitant area

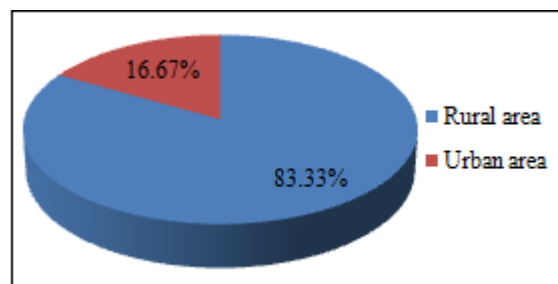| Hailing Place	Number	Percentage
Rural area	50	83.33%
Urban area	10	16.67%
Total	60	100%

Figure 2

(8) Time of presentation at the hospital (Duration of symptoms)

Table 8: Time of presentation

Time of presentation	Number	Percentage
0-5 days	10	16.67%
6-10 days	12	20%
11-30 days	28	46.67%
>30 days	6	10%
Unknown duration	4	6.67%
Total	60	100%

(9) Visual status of the patient at the time of presentation

Table 9: Visual status

Visual status	Number	Percentage
6/6 -6/18	4	6.67%
6/24-6/60	12	20%
Less than 6/60	44	73.33%
Total	60	100%

(10) Clinical presentation of the patients

Table 10: Clinical presentation

Clinical presentation	Number	Percentage
Ulcer with epithelial lesion	24	40%
Stromal ulcer with satellitelesion	16	26.67%
Ulceration with hypopyon	16	26.67%
Ulcer with hyphae formation	2	3.33%
Ulcer with immunering	2	3.33%
Total	60	100%

(11) Microbiological finding in the patients:-

a) **KOH. Staining:-** With 10% KOH mounting, fungal elements were revealed in 100% of the cases (since ten cases of suspected Keratomycosis showing no fungal element were excluded)

b) **Culture findings:** Fungal isolates were detected in the culture of corneal scrapings in all cases (Ten patients of suspected Keratomycosis without growth were excluded).

Table below shows the type of fungus revealed in culture along with their incidence:-

Table 11: Culture findings

Type of Fungus	Number of Positive cases	Percentage
Aspergillus	40	66.67%
Fusarium	8	13.33%
Penicillium	6	10%
Candida albicans	4	6.67%
Unknown	2	3.33%
Total	60	100%

4. Discussion

In the present prospective study, fungal corneal ulcers were found to be more prevalent among males (63.33%) than females (36.67%). This male preponderance was also noticed (M=76% and F=24%) by Akshana et al [14]; by M Jayahar et al with 65.02% of males [15] and by Jyothi N. et al with 64.58% of males and 35.42% of females [6]. In our study, age distribution of patients with fungal keratitis ranged from 0-80 years of age. Maximum number of patients belonged to the age group between 41-50 years (96.67%). This finding is comparable with the findings of Sujit Desmukh et al [9] and Jyothi N et al [6] who noted that maximum number of patients were in the age group between 41-60 years while Akshaya R et al found maximum cases in the age between 51-60 years [14]. We found trauma as the most common predisposing factor (53.33%) in keratomycosis and various authors' studies namely Sujit Deshmukh et al (trauma in 48.03% of cases) [9], Parmjeet Kaur Gill et al (trauma in 90% cases)[16] and Srinivasan M et al (trauma in 52.8%) [17] also noted trauma as the

commonest predisposing factor. Most common traumatic agent encountered in our study population was vegetative materials (37.50%), followed by sand/dust (25%), wood (12.50%), Leaf (12.50%), cows tail (6.25%) and finger nails also as 6.25%. Akshaya R et al also in 2010 [14] at Hyderabad found similar traumatic agents involved in Keratomycosis namely; sand (20%), wood/stick (18%), leaf /thorn (8%), vegetative matter (6%), finger nail (4%) among few others. Likewise Dr. K. V. Rajuet al [18] also noted trauma in corneal fungal ulcers caused by leaf and thorn in 26.7%, stick in 13.3% and coconut shell in 3.3%.

Apart from trauma, there were other important predisposing factor in keratomycosis which were noted in our study namely; topical steroid use (26.67%), excessive use of antibiotics (13.33%), use of traditional eye medicine (16.67%), chronic Dacryocystitis (16.67%), dry eye (6.67%), and Diabetes (20%). These findings corroborate with the findings of Sujit Deshmukh et al [9] who noted the following factor: topical steroid use (25.20%), traditional eye medicine (11.82%), chronic Dacryocystitis (11.81%), Lid abnormalities (6.30%), Blepharitis (5.51%), Bell's palsy (1.57%), Dry eye (1.57%) and Diabetes (7.87%). P. Kaur Gill et al [16] also observed over use of antibiotics (62.50%), topical steroid (41.67%), Diabetes (6.94%) and Tuberculosis (12.5%). As regards occupational status of the patients, farmers were mostly affected by fungal keratitis (40%) followed by manual labour (20%), individuals in household activities (33.33%), students (3.33%) among others as observed in our study. In the study conducted by Jyothi N. et al also [6] agriculturist accounted for maximum number of cases (43.57%) followed by labourers (31.25%), Gardeners (12.50%), House wife (6.25%), students (4.16%) and Businessman (2.08%). Similar results were also documented by Dr. K. L. Naidu et al [19] and P. Kaur Gill et al [16]. Most of the patients with keratomycosis belonged to rural area and less patients were from urban region as evident from below findings:-

Table 12

Place	Present Study	K. L. Naidu et al [19]	S. Deshmukh et al [9]	Sanjeev et al [20]
Rural Area	83.33%	74%	91.34%	81.88%
Urban Area	16.67%	26%	8.66%	18.12%

Duration of symptoms of the patients (time of presentation) ranged from 0 day to more than 30 days in our study in which maximum number of patients (46.67%) presented at hospital in between 10 to 30 days and 16.67% of patients came early in between 0 to 5 days and few came very late. Similar findings (14% in 0-5 days, 19% in 6-10 days, 43% in 11-30 days, 10% in more than 30 days and in 14% duration was not known) were noted in respect of duration of symptoms by Akshaya R et al [14]. Visual status of our patients at the presentation ranged from less than 6/60 to less than 6/60 (44 cases -73.33% i. e. $>2/3^{rd}$ of patients). Findings of Khare P et al [22] in respect of visual status of cases at presentation ($2/3^{rd}$ of the patients had vision <3/60 in affected eye) are comparable to our results. Panda A et al also found likewise results [8]. The common clinical presentations of keratomycosis in present study were ulcer with epithelial erosion (40%), Stromal ulcer with satellite lesion (26.67%), Hypopyon (26.67%) along with others.

Similar results were observed in study of Rajpal Singh Punia et al [21] (hypopyon-40.97%, epithetic defects-31.82%, corneal thinning-27.27%, perforation- 22.73% and K. V. Raju et al [18] (hypopyon-29.70%, satellite lesion-10%, perforation-3.3%). In our study, 10% KOH mount showed fungal element in 100% cases and Gram stain smear was positive in 10% of these cases along with KOH mount positive showing mixed infection. In the study of Dr. K. V. Raju [18] also, KOH mount was positive in 90% cases while the sensitivity of the KOH mount and gram stain smears were 88.64% and 90.91% respectively in the findings of R. Singh Punia et al [21] and these findings corroborates with our study. In the present study, culture of corneal scrapings were positive in 100% of cases after exclusion of 10 clinically suspected case with no fungal element and there were Aspergillusin 66.67%, Fusarium in 13.33%, Penicillium in 10%, Candida albicans in 6.67% and in 3.33%type of fungus could not be identified. In P. Kaur Gill et al's study also [16]Aspergillus was isolated in 50% cases, followed by Candida in 20%, Fusarium in 15%, Penicillium in 9.7%, Curvularia in 9.7% among others and in the findings of Dr. K. L. Naidu et al [19] Aspergillus accounted for 30%, Fusarium for 18%, Curvularia for 5% and Candida for 1%. These results are comparable with our findings. Our results also corroborates with the findings of Sanjeev H. et al [20] in which Aspergillus was detected in 61.5% cases followed by Fusarium in 11.53%, Penicllium in 11.53%, Candida albicans in 7.69% among others.

5. Conclusion

Keratomycosis is still prevalent and present as a leading and challenging cause of uniocular morbidity and blindness in the developing countries particularly in the rural areas. It is a prevalentable disease but poses challenging to the Ophthalmologist since the clinical presentation of mycotic keratitis is often confusing and needs a high degree of suspicion and clinicians ought to be well versed with the predisposing factors. Trauma is the commonest factor involved in keratomycosis and male individuals engaged in outdoor agricultural activities are mostly affected. Patients present at the hospitals at different times with different clinical manifestations. The KOHmount is very sensitive, simple and fast test in the detecting fungal elements. Aspergillus and Fusarium are found to be commonest microorganism in Keratomycosis. Culture results provide the microbiological confirmation in respect of the fungus involved and guide the appropriate line of treatment for achieving best outcome in the long run. Continued research work is thus recommended for better understanding of clinicomicrobiological profile in fungal keratitis and thereby providing appropriate and effective management and for better prognosis.

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