

Clinico-epidemiological profile of patients with microbial keratitis in Kashmir valley

Shafi T¹, Wani RM², Muzaffar T³, Ashai M⁴, Suraya S⁵

¹Dr Tufela Shafi(MS), Department of Ophthalmology, Government Medical College, Srinagar, (Kashmir), India. ²Dr Raashid Maqbool Wani (MS), Department of Ophthalmology, Government Medical College, Srinagar, (Kashmir), India. ³Dr Tasneem Muzaffar (MS), SKIMS, Srinagar (Kashmir), India. ⁴Dr Mehmooda Ashai (MS). Retired Professor at Department of Ophthalmology, Government Medical College, Srinagar (Kashmir), India. ⁵Dr Saqib Suraya (MBBS), Department of Ophthalmology, Government Medical College, Srinagar, (Kashmir), India

Address for Corresponding : Dr Raashid Maqbool Wani, H No 132 Doctors Enclave, Green Lane, Hafiz Colony, Behind Police Head Quarters, Peerbagh, Srinagar, Kashmir, India, **Email address:** raashid.maqboolwani@gmail.com

Abstract

Purpose: This study was undertaken to provide information on the clinico-epidemiological profile of patients clinically suspected with bacterial and fungal keratitis, who were admitted in the Ophthalmology unit of a tertiary center during a 2 year period. **Methods:** This is a prospective study of all the patients who were admitted in the eye ward of Government Medical College Srinagar (India) between September 2010 and September 2012. 100 patients of bacterial and fungal corneal keratitis without any history of preexisting ocular or systemic disease were included in the study. All patients were assessed, admitted and completely evaluated in hospital and managed accordingly. Corneal ulcer scrapings were taken at presentation, at the Department of Microbiology. **Results:** Maximum numbers of patients among males (61.90%) were agricultural workers and among females, 81.08% were housewives. It was seen that majority of patients (79%) presented within 1st week of onset of symptoms and among them growth was seen in 64.6%. Growth was seen in 32cases (72.72%) out of 44 cases who gave a history of trauma whereas growth was seen in 36 cases (64.28%) who did not give a clear history of trauma. **Conclusion:** Bacterial and fungal keratitis in Kashmir is more prevalent in rural areas, with men being more at risk of developing the disease. There is a seasonal variation in the incidence of the disease; higher cases being reported during the harvesting season. Trauma with organic or vegetable matter is a common preceding factor. Microbiological studies should preferably be carried out in all cases.

Key words: Bacterial Keratitis, Fungal Keratitis, Antibiotic Sensitivity.

Introduction

In India, it is estimated that there are approximately 6.8 million people who have vision less than 6/60 in at least one eye due to corneal diseases; of these, about a million have bilateral involvement[1,2]. The infective agent may be in the form of bacteria, fungi, viruses and protozoa. If the causal agent can be established early in the infective process, a more effective therapeutic regimen is possible. Every case of corneal ulcer should be treated as an ocular emergency and the patient should ideally be admitted to a hospital where he/she can be closely monitored and controlled drug treatment administered. The two important factors in the causation, progress and prognosis of corneal ulcers are

virulence of the organism invading the cornea and the inherent resistance of corneal tissue. This resistance is afforded by three great barriers namely intact corneal epithelium, microscopic film of tears and meibomian secretion and by the movement of the upper eyelid [3].

Bacteria causing keratitis may be Gram-positive or Gram-negative. The ability of an organism to adhere to the edge or base of epithelial defect is important for disease process. Such an organism has the ability to invade stroma despite adequate host-defenses [4]. Staphylococcus aureus, Streptococcus pneumoniae and Pseudomonas aeruginosa have such ability [5,6]. Though filamentous fungi, yeasts and dimorphic fungi have been reported to be causative for infectious keratitis in humans, but Fusarium,

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Aspergillus and Candida are most commonly implicated [7].

Material And Methods

This study was conducted in the Department of Ophthalmology, Government Medical College Srinagar over a period of two years from September 2010 to September 2012. 100 cases of clinically suspected bacterial and fungal keratitis, who presented in the OPD were included in the study.

Exclusion criteria included suspected or typical viral corneal ulcers on the basis of corneal sensation and ulcer morphology, Mooren's ulcer/healing ulcer/atheromatous ulcer, marginal keratitis/interstitial keratitis/neurotropic keratitis, suspected protozoal/mycobacterial keratitis, ulcers associated with systemic or autoimmune diseases.

All the patients underwent a complete evaluation which included detailed history taking, visual acuity, corneal sensations, slit lamp examination of the eye and fundus examination. A detailed slit lamp examination of

corneal ulcer was carried out after staining it with wet fluorescein paper strip. Location of the ulcer, size of the epithelial defects was measured by the variable slit on the slit lamp, depth of involvement of the cornea, level of hypopyon and condition of the rest of the cornea were noted. Corneal ulcer scrapings were taken at presentation in patients with no history of topical drug use or twenty-four hours later in patients with known or suspected history of use of topical medication, after stopping the medication for twenty-four hours. After this, smears were smeared onto two slides for Gram staining and staining with potassium hydroxide with calcofluor white (KOH + CFW). The Gram smear was examined under oil immersion microscope and KOH mount under high power microscope. The results were noted and later were correlated with growth on culture media.

Statistical analysis: Data was expressed as mean± standard deviation and percentage. The data was analyzed and compared by using Pearson's chi-squared test.

Results

A total of 100 patients of corneal ulcers without any history of preexisting ocular or systemic disease were included in the present study. Out of 100 patients studied, 63 were males and 37 were females. The age of male patients ranged from 5-70 years with a mean of 46.19 years and a standard deviation of 15.96. The age of female patients ranged from 18-60 years with a mean of 39.27 years and a standard deviation of 13.19. Maximum incidence of infective keratitis was noted in the age group of 19-45 years (Table 1). In the present study, it was observed that 90% of the patients hailed from rural areas. The likelihood of infective keratitis in rural population was nine times more than urban population which is statistically significant ($p < .05$) (Chart 1).

Table 1: Age and sex distribution

Age (yrs)	Male		Female		Total	
	No.	%age	No.	%age	No.	%age
≤18	06	09.52	01	02.70	07	07.00
19-45	28	44.44	26	70.27	54	54.00
46-65	25	39.68	10	27.02	35	35.00
>65	04	06.34	0	0	04	04.00
Total	63	100.00	37	100.00	100	100.00

In our study, infective keratitis was more commonly seen in farmers/agricultural workers followed by housewives, laborers/ unskilled workers, semiskilled workers and students. This is statistically significant ($p = .049$) implying that certain occupational groups are more at risk of having infective keratitis (Table 2). In the present study, the incidence of infective keratitis was seen to be more in autumn and spring season. This is statistically significant ($p < .001$) implying a relationship between the incidence of infective keratitis and the season. In the present study, left eye was involved in more cases than in right eye. No case of bilateral eye involvement was seen. In our study, it was seen that majority of patients (79%) presented within the 1st week of symptoms whereas only 21% patients presented after one week of onset of symptoms. (Table 3).

Table 2: Incidence of infective keratitis in various occupation groups

Occupation	Male		Female		Total	
	No.	%age	No.	%age	No.	%age
Farmers/Agricultural workers	39	61.90	0	0	39	39.00
Labourers/Unskilled workers	11	17.46	04	10.81	15	15.00
Semi-skilled workers	08	12.69	02	05.40	10	10.00
Students	05	7.93	01	02.70	06	06.00
Housewives	0	0	30	81.08	30	30.00
Total	63	100.00	37	100.00	100	100.00
		Value	Asymp. Sig. (2-sided)			
Pearson Chi-Square		7.844	P= 0.049 (p<.05)			

Table 3: Observations from History Taking

Observations from History taking		No.	%age
Rural/Urban distribution of patients with Infective Keratitis	Rural	90	90.00
	Urban	10	10.00
	Total	100	100.00
Seasonal Variation of Infective Keratitis	Spring	30	30.00
	Summer	13	13.00
	Autumn	43	43.00
	Winter	14	14.00
	Total	100	100.00
Involved Eye	Right	46	46.00
	Left	54	54.00
	Total	100	100.00
Interval between symptoms and presentation	≤1 week	79	79.00
	>1 week	21	21.00
	Total	100	100.00
Predisposing Factors	Trauma due to organic vegetable matter	35	35.00
	Trauma due to other causes (stone, iron chip, dust, etc)	09	09.00
	No apparent cause/History unclear	56	56.00
	Total	100	100.00
Previous medication used	Antibiotics	27	27.00
	Antifungals	02	02.00
	Antibiotics and Antifungals	02	02.00
	Antibiotic Steroid combination	03	03.00

	Nature Unknown (Quacks, Ayurvedic medications)	13	13.00
	No treatment received	53	53.00
	Total	100	100.00

In the present study 44 patients had a definite history of trauma. 35 of these had a history of trauma with organic /vegetable matter (paddy /maize leaves, thorns, twigs, animal tails, cow dung, etc.), whereas 9 patients had history of trauma with inorganic material (stone/ iron chips, glass pieces, sand, dust, etc). 56 patients did not give any history of trauma. (Table 3). In our study 47 patients had sought some sort of primary care and were on medication before presenting to us.

Table 4: Other associated observations

Observations	No.	%age	
Visual Acuity in involved eye	6/6 to 6/12	12	12.00
	6/18 to 6/36	16	16.00
	≤ 6/60	72	72.00
	Total	100	100.00
Location of Corneal Ulcer	Central	47	47.00
	Paracentral	32	32.00
	Both (Central/Paracentral)	21	21.00
	Total	100	100.00
Shape of Corneal Ulcer	Round	45	45.00
	Oval	31	31.00
	Irregular	24	24.00
	Total	100	100.00
Size of Epithelial defect (sq. mm)	≤5	33	33.00
	5.1 – 15	43	43.00
	> 15	24	24.00
	Total	100	100.00
Margins of Corneal Ulcer	Regular	55	55.00
	Irregular	45	45.00
	Total	100	100.00
Corneal Ulcer Depth	≤1/2	92	92.00
	>1/2	08	08.00
	Total	100	100.00
Level of Hypopyon	Nil	45	45.00
	<1/3	39	39.00
	1/3-1/2	16	16.00
	>1/2	0	0
	Total	100	100.00

The other associated observations that were seen in the present study included visual acuity status in the involved eye; location, depth, size of ulcer and level of hypopyon. Majority of the patients (72%) presented with visual acuity ≤ 6/60 in the affected eye. Only 12% patients presented with visual acuity between 6/6 – 6/12 whereas 16% patients had visual acuity between 6/18 – 6/36. With respect to the location of ulcers, majority were either central (47%) or paracentral

(32%). Only 21% involved both the regions. In our study, 55% patients presented with varying levels of hypopyon of which 70.90% (39) presented with hypopyon less than 1/3rd chamber and 29.09% (16) with hypopyon between 1/3 to 1/2. No patient presented with level of hypopyon >1/2 chamber. The depth of ulceration was less than 1/2 of the corneal thickness in majority of our patients (92%). 43% of our patients had an epithelial defect between 5.1 to 15 sq. mm whereas 33% had epithelial defect less than 5 sq. mm. Only 24% of our patients had epithelial defect greater than 15 sq. mm. (Table 4)

Discussion

In the present study, infective (bacterial and fungal) keratitis was more common in males (63%) as compared to females (37%). Similar observations have been made by other authors [8, 9, 10, 11]. By nature of their work profile, men are more exposed to outdoor trauma thereby increasing their vulnerability to infective keratitis. However, Bourcier et al and few other authors reported an equal distribution of infective keratitis between males and female [12, 13, 14].

The age group most affected in the present study was 19- 45 years. This is the physically active group which is most exposed to outdoor trauma and hence is at maximum risk of infective keratitis. Besides, this is also the major bread earning group; in this group, infective keratitis is of greater economic consequence, which may be the reason for higher reporting of cases. Similar involvement of younger age group has also been reported by Fudnawala et al [8], Basak et al [9], Pichare et al [10] and Subudhi et al [15]. On the other hand, Bharathi et al [16] and J Chander et al [17] found patients aged more than 50 years to be more commonly affected. 90% of the patients in the present study hailed from rural areas and only 10% from urban areas. Statistically, the likelihood of keratitis in the rural population was nine times greater. This can be explained on the basis that about 75% of our population resides in villages. Besides, in the rural areas, people are generally involved with agriculture, farming and related activities and hence are more exposed to trauma. Besides, there is also poor awareness about ocular hygiene amongst rural people. Higher incidence of infective keratitis in rural populations has also been reported by Subudhi et al [15], Basak et al [9], Bharathi et al [16]. However T Bourcier et al [12] has reported a higher incidence of infective keratitis amongst the urban population.

In the present study, farming/ agriculture was the major occupation group affected. This can again be explained by the fact that majority of our population lives in rural areas where farming is the chief occupation. This occupation also makes them susceptible to injuries by

vegetative matter, animals, etc. Similar observations have been made by Subudhi et al [15] and Basak et al [9]. Bharathi et al [16] have however reported a higher incidence in non agricultural workers.

The second most common occupation group involved was housewives. This is because women in rural areas are actively involved in farming and gardening besides housework which places them at an even higher risk. Kotigadde Subbannayya et al [18] have also reported a higher incidence of mycotic keratitis amongst females. We observed a higher incidence of infective keratitis in autumn season (August, September and October) and spring season. This is because autumn season is the harvesting season in Kashmir and there are a higher number of injuries during this season. Spring corresponds to the sowing season and hence to period of outdoor activity. Seasonal relation of infective keratitis has been noted in other studies also [9]. Leck et al [19] reported an increase in number of cases of suppurative keratitis during the harvesting period land windy season. Anuradha Chowdhary and K Singh [20] reported a high incidence of fungal keratitis in autumn season. Bharathi et al [16] found a lower incidence of bacterial keratitis from June to September. Dunlop et al [21] have reported *Pseudomonas* ulcers mostly in monsoon season and *Fusarium* ulcers only in hot dry season. However, Leck et al [19] reported fungal ulcers to be high throughout the year. Kotigadde Subbannayya et al [18] did not observe any seasonal relation of mycotic keratitis.

In the present study, left eye was involved in more cases than right eye. No case of bilateral eye involvement was seen. However this is statistically insignificant and has no bearing on culture results. Subudhi et al [15] found more involvement of right eye whereas Bourcier et al [12] found left eye to be involved in higher number of cases. Bourcier also reported bilateral eye involvement in 9 cases.

In our study, 79% patients presented in the 1st week whereas 21% after the 1st week of onset of symptoms. The early presentation may be attributed to the fact that

corneal ulcers are associated with symptoms like pain and foreign body sensation as well as the fact that corneal ulcers have a significant impact on vision prompting the patients to seek early ophthalmological consultation. Bourcier et al [12] found the delay between onset of symptoms and 1st examination to be 7 days, whereas Laspina et al [11] found it to be more than 1 week. Basak et al [9] found majority of patients presenting in 2-3 week of illness whereas Fudnawala et al [8] reported that 75% of cases presented in less than 2 weeks of onset of symptoms and the rest after 2 weeks.

In the present study, 44 patients gave a clear history of trauma out of which 35 had a history of trauma with organic/ vegetable matter whereas 9 patients had history of trauma with inorganic material. Schafer et al [22], Srinivasan et al [23], Tanure et al [13], Basak et al [9] reported corneal trauma in 20%, 65.4%, 8.3% and 82.9% cases, respectively. However, Dunlop et al [21] did not report a common antecedent history of trauma. Higher incidence of trauma with vegetable matter is because of higher association of our population with agriculture and farming.

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