Research Article

A clinical study of pattern, complications, and visual outcome of viral keratitis

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ABSTRACT

Background: Herpes simplex viral (HSV) keratitis typically presents as an infection of the superficial layer of the cornea, with punctate or diffuse branching (dendritic) lesions of the epithelium that do not usually involve the stroma in primary infections. The most cases of herpes simplex keratitis are due to reactivation of the virus from latency leading to recurrent episodes of corneal inflammation and scarring. **Objective:** To study the seasonal variation, recurrence, and precipitating factors for viral keratitis. **Materials and Methods:** This study consisted of 119 eyes of 110 patients consecutively from outdoor and those admitted in tertiary care hospital in central India, from May 2010 to November 2012. All patients were clinically diagnosed as viral keratitis. All patients underwent the detailed examination protocol. At the completion of the study, statistical data were analyzed. **Results:** Incidence of HSV keratitis was high in younger age group (21-40 years of age), in patients more than 60 years of age group, in the months of May to August. It was predominantly found in laborers. Fever and common cold were the important factors in the recurrence of HSV viral keratitis. Few cases of recurrence reported the use of traditional eye medications and steroids and had more worsened visual acuity in this study. **Conclusion:** Patient counseling in HSV keratitis is must during the 1st attack, regarding nature of disease, certain triggering factors, and importance of regular follow-ups.

KEY WORDS: Herpes Simplex Keratitis; Herpes Zoster Ophthalmicus; Viral Keratitis; Seasonal Variation; Recurrence

INTRODUCTION

The incidence of viral keratitis in India has shown a steep rise due to improved socioeconomic changes and indiscriminate widespread use of antibiotics and corticosteroids. The episodes of recurrent herpes simplex viral (HSV) keratitis although occurring all year, tend to be more frequent in winter.[1]

Varicella zoster virus can persist in a latent form. Hutchinson's sign is much more predictive (50-85%) of ocular involvement and is strongly prognostic for ocular inflammation and corneal sensory denervation.[2]

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Adenovirus subtypes 1, 3, 7 and 14 produce pharyngoconjunctival fever of which about 30% cases develop corneal lesions which are mild and self-limiting.[3]

Aims and Objectives

- To study the incidence of viral keratitis in hospital based population and its relation to age, sex, and occupation
- To study the complications with special reference to recurrence of viral keratitis and its precipitating factors
- To study the pattern of seasonal variation in viral keratitis.

MATERIALS AND METHODS

This study was a hospital-based observational study conducted on patients clinically diagnosed as having viral keratitis. A total of 119 eyes of 110 patients were included consecutively from outdoor and those admitted in Department of Ophthalmology, S.S. Medical College and

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Gandhi Memorial Hospital, Rewa (Madhya Pradesh), from May 2010 to November 2012.

Inclusion Criteria

- Clinically diagnosed viral keratitis cases with typical characteristic features
- Follow-up cases of clinically diagnosed viral keratitis having recurrence
- Recurrent cases diagnosed elsewhere.

Exclusion Criteria

- Bacterial and fungal keratitis
- Any other corneal pathology is causing visual impairment.

History of onset of disease, complaints of intolerance to light, foreign body sensation, watering, diminution of vision and pain and redness in the eye was recorded. History of each case noted with special attention to recurrences and their severity.

History of stress, prolonged fever, inherited immune disorder, atopy, and allergy was recorded. Use and abuse of corticosteroids, use of anti-glaucoma drugs, immunosuppressive drugs, chemotherapy, any traditional eye medication (TEM), and contact lens were noted.

History of any chronic illness likes tuberculosis, diabetes mellitus, malaria, malignancy, and syphilis was noted. History of trauma, ocular surgery was noted. Season at the time of presentation was documented.

General examination was done with special reference to immune status, vitamin A deficiency and malnutrition. A complete ocular examination was done with specific importance to cornea. The corneal ulcer examination was done under following heads-site, size of the ulcer, shape, margins, and floor of the ulcer, depth of the ulcer, surrounding area of ulcer and density of infiltration, vascularisation, and degree of stromal edema. Corneal sensations were also tested in all cases.

Corneal scrap for culture and relevant blood investigations were done in all cases. All patients were given treatment. For HSV keratitis, debridement was done for dendritic but not geographic ulcers. Acyclovir 3% ointment 5 times a day for 2 weeks along with cycloplegics was given. In addition, topical steroids with topical acyclovir were used for disciform keratitis. Acyclovir tablets 400 mg twice a day for a month was given for patients with more than 3 episodes of recurrence and immune compromised patients. For herpes zoster ophthalmicus (HZO) patients, tablet acyclovir 800 mg 5 times a day was prescribed for 10 days. Systemic steroid like prednisolone 40-60º mg daily was given in tapering doses for 7 days. Aciclovir 3% eye ointment 5 times a day and acyclovir 5% skin ointment were prescribed over skin vesicles for 2 weeks. For patients with adenoviral keratitis, topical steroids with antibiotic combination were used in tapering doses for 7 days along with topical cycloplegics. All cases were supplemented with topical carboxymethyl cellulose eye drops, oral diclofenac sodium, and multivitamins. All patients were followed up at 15 days, 1, 2 and 3 months. The amelioration of signs and symptoms was recorded in every follow-up.

RESULTS

In our study, maximum number of cases of HSV keratitis (53.24%) was found in 20-41 years of age group and HZO keratitis (15) in >60 years of age (Table 1).

The most patients of HSV keratitis (*N* = 51; 66.23%) as well as HZO (*N* = 17; 85%) were males. In other viral keratitis maximum (9) cases were male (Table 2).

Occupation wise, the most frequently affected patients were laborers in all types of viral keratitis (HSV keratitis = 48.05%; HZO = 25%; other viral keratitis = 61.5%) (Table 3).

More number of patients of HSV keratitis reported in the months of May (9 cases), June (11 cases), July (13 cases), and August (11 cases). However, no such seasonal predominance was observed in patients of HZO and other types of viral keratitis (Table 4).

Observing the pattern of lesions, the dendritic pattern was the most common (57.14%) followed by superficial punctate keratitis (31.16%) in patients with HSV keratitis while in HZO, it was pseudo dendritic pattern in 13 (65%) cases and

Table 1: Age distribution

Age group (years)	*N* (%)		
	HSV keratitis	HZO keratitis	Other viral keratitis
10-20	4 (5.19)	0 (0)	5 (38.46)
21-40	41 (53.24)	2 (10)	7 (53.84)
41-60	23 (29.87)	3 (15)	1 (7.69)
>60	9 (11.68)	15 (75)	0 (0)
Total	77 (100)	20 (100)	13 (100)

HSV: Herpes simplex viral, HZO: Herpes zoster ophthalmicus

Table 2: Sex distribution

Sex	*N* (%)		
	HSV keratitis	HZO keratitis	Other viral keratitis
Male	51 (66.23)	17 (85)	9 (69.23)
Female	26 (33.7)	3 (15)	4 (30.76)
Total	77 (100)	20 (100)	13 (100)

HSV: Herpes simplex viral, HZO: Herpes zoster ophthalmicus

3 (15%) cases each of stromal and keratouveitis. Pseudo dendritic pattern was always associated with vesicles over face, unilateral along the area of distribution of ophthalmic division of trigeminal nerve. In other viral keratitis, all (*N* = 13; 100%) cases had superficial keratitis (Table 5).

The most common complication in patients of HSV keratitis was recurrence seen in 52 (67.53%) patients, followed by neovascularization (*N* = 15; 19.48%) and corneal opacity (*N* = 10; 12.98%). More than three recurrences were noted in 18 (16.36%) patients. In HZO keratitis trigeminal neuralgia was the commonest complication, observed in 18 patients (90%), followed by neurotrophic keratitis (*N*=8; 40%) and corneal opacity (*N* = 4; 20%) (Table 6).

In our study, 63 patients reported associated factors before recurrence. However, no specific factor could be labeled as a cause for recurrence. Maximum number among them reported fever (28 patients) before the episode of recurrence (Table 7).Visual acuity of the patients with different viral keratitis has been described in Tables 8-10.

Table 3: Occupation

Occupation	*N* (%)		
	HSV keratitis	HZO keratitis	Other viral keratitis
Laborers	37 (48.05)	5 (25)	8 (61.53)
Student	15 (19.48)	-	1 (7.69)
Farm workers	10 (12.98)	-	2 (15.38)
Teachers	3 (3.89)	-	-
Others	12 (15.58)	15 (75)	-
Total	77 (100)	20 (100)	13 (100)

HSV: Herpes simplex viral, HZO: Herpes zoster ophthalmicus

Table 4: Seasonal variation

Month	*N* (%)		
	HSV keratitis	HZO keratitis	Other viral keratitis
January	4 (5.19)	1 (5)	2 (15.38)
February	3 (7.79)	2 (5)	-
March	4 (5.19)	1 (15)	1 (7.69)
April	5 (6.49)	2 (5)	-
May	9 (7.79)	2 (10)	2 (15.38)
June	11 (14.28)	2 (10)	-
July	13 (16.88)	1 (5)	1 (7.69)
August	11 (14.28)	3 (15)	2 (15.38)
September	7 (9.09)	1 (5)	1 (7.69)
October	5 (6.49)	2 (10)	1 (7.69)
November	2 (2.59)	1 (5)	2 (15.38)
December	3 (3.89)	2 (10)	1 (7.69)
Total	77 (100)	20 (100)	13 (100)

HSV: Herpes simplex viral, HZO: Herpes zoster ophthalmicus

Table 5: Pattern of lesions at the time of presentation

Pattern	*N* (%)		
	HSV keratitis	HZO keratitis	Other viral keratitis
Superficial punctate keratitis	24 (31.16)	1 (5)	13 (100)
Dendritic	44 (57.14)	0 (0)	0 (0)
Pseudodendritic	0 (0)	13 (65)	0 (0)
Geographical	3 (3.89)	0 (0)	0 (0)
Stromal	6 (7.79)	3 (15)	0 (0)
Keratouveitis	0 (0)	3 (15)	0 (0)

HSV: Herpes simplex viral, HZO: Herpes zoster ophthalmicus

DISCUSSION

In our study, HSV keratitis was found most frequently (53.24%) in the age group 20-41 years while HZO keratitis was most common (75%) in patients >60 years of age. Khurana et al.[4] observed that maximum number of HSV keratitis cases (59.6%) were in the age group of 21-40 years. We observed that the common age for developing HSV keratitis is the younger adult group, i.e., the period of life exposed to more stress, strain and trauma while HZO keratitis is more common after 60 years of age. Mather et al.[5] studied 101 patients of viral keratitis and reported that for HZO keratitis highest incidence occurred among those aged 85 or older.

Table 6: Predisposing factors for recurrence

Factors	*N* (%)
Fever	28 (25.45)
URTI	11 (10)
Surgical trauma	7 (6.36)
Steroid	8 (7.27)
TEM	9 (8.18)
Unknown	47 (42.72)

URTI: Upper respiratory tract infection, TEM: Traditional eye medication

Table 7: Complications of viral keratitis

Complications	*N* (%)		
	HSV keratitis	HZO keratitis	Other viral keratitis
Corneal opacity	10 (12.98)	4 (20)	0 (0)
Recurrence	52 (67.53)	0 (0)	0 (0)
Neovascularization	15 (19.48)	2 (10)	2 (15.38)
Uveitis	0 (0)	3 (15)	0 (0)
Neurotrophic keratitis	0 (0)	8 (40)	0 (0)
Glaucoma	0 (0)	3 (15)	0 (0)
Trigeminal neuralgia	0 (0)	18 (90)	0 (0)
None	10 (12.98)	0 (0)	11 (84.61)

HSV: Herpes simplex viral, HZO: Herpes zoster ophthalmicus

Table 8: Visual acuity in HSV keratitis

Visual acuity	At presentation	At 1st follow-up	At 2nd follow-up	At 3rd follow-up
6/6	12	16	10	4
6/9 to 6/18	25	31	33	32
6/24 to 6/60	35	27	29	35
<6/60	5	3	5	6

HSV: Herpes simplex viral

Table 9: Visual acuity of HZO keratitis

Visual acuity	At presentation	At 1st follow-up	At 2nd follow-up	At 3rd follow-up
6/6	5	4	7	14
6/9 to 6/18	8	10	11	5
6/24 to 6/60	7	6	2	1
<6/60	-	-	-	-

HZO: Herpes zoster ophthalmicus

Table 10: Visual acuity of other viral keratitis

Visual acuity	At presentation	At 1st follow-up	At 2nd follow-up	At 3rd follow-up
6/6	8	9	12	12
6/9 to 6/18	5	4	1	1
6/24 to 6/60	-	-	-	-
<6/60	-	-	-	-

Gender distribution of viral keratitis showed a male preponderance in all types with 66.23% males of HSV keratitis, 85% males with HZO, and 69.23% males of another viral keratitis. Similar observations have been made by Khurana et al.[4] who reported that in viral keratitis, 74.8% patients were males and Bell et al.[6] who reported high male to female ratio in patients older than 40 years of age (1.67:1.0; $P < 0.03$).

Low incidence observed in females in this series may be due to that females are less exposed to trauma and ultraviolet radiation.

In HSV keratitis, the most patients ($N = 39$; 50.64%) patients belonged to middle socioeconomic status and were from rural areas ($N = 30$; 38.96%). In HZO keratitis, most patients (60%) belonged to lower socioeconomic group and were from rural areas ($N = 11$; 55%).

In this study, 34 patients of HSV keratitis reported in the months of May to August while the least number (2 cases) were reported in November. In HZO keratitis maximum number (3 cases) were reported in the month of August. Kabra et al.[7] reported maximum cases in autumn, in India. Bell et al.[6] reported that maximum number of cases was observed from November to February than during other months of the year. Darougar et al.[8] reported that prevalence of disease was higher in the months of January to June than in July to December.

In HSV keratitis, the dendritic pattern was the most common type of lesion seen in 44 cases followed by superficial punctate keratitis in 24 (31.16%) cases. The geographical pattern was seen in 3 (3.89%) cases and stromal keratitis in 6 (7.79%) cases. In HZO keratitis, the pseudo dendritic pattern was observed in 13 (65%) cases while 3 (15%) cases each showed stromal keratitis and keratouveitis. In another viral keratitis, 13 cases presented with superficial keratitis. The pseudo dendritic pattern was always associated with skin lesions (vesicles) over face, unilateral along the area of distribution of ophthalmic division of trigeminal nerve suggestive of HZO keratitis.

Gamus et al.[1] reported dendritic keratitis in 63.3% cases. Khurana et al.[4] reported that dendritic keratitis was most common (20.7%) followed by geographical ulcer (18.2%). Disciform keratitis was found in 11.6% of cases. Pramod[9] studied 324 cases among them, 137 cases presented with "first episode" of HSV keratitis and 97 had recurrent infection. The clinical characterization of these cases showed that 153 had epithelial keratitis and 81 stromal infiltrations, 92 cases presented with dendritic ulcer, 20 had geographic, and 23 had superficial punctate keratitis. Disciform keratitis was seen in 66 and necrotizing stromal keratitis was seen in 15 cases. Kabra et al.[7] reported that different types of clinical presentation in clinically diagnosed 212 patients (220 eyes) of viral keratitis were as follows: 44 of the total 220 eyes presented with purely epithelial lesions, out of which 35 were dendritic and nine were dendrogeographic ulcers. 118 eyes presented with purely stromal lesions, 39

eyes presented with epithelial and stromal lesions, and 19 eyes with endothelitis. Souza et al.[10] studied 544 patients of HSV keratitis reported that recurrent blepharoconjunctivitis was noted in 8 eyes, epithelial keratitis in 12 eyes, stromal keratitis in 9 eyes, necrotizing stromal keratitis in 5 eyes, and progressive endotheliitis in 2 eyes. The low incidence of disciform keratitis in this series may be due to the early diagnosis and immediate treatment being given to patients. In our series, we found that pseudodendritic pattern is common in HZO. Ghaznawi et al.[11] reported that pseudodendritic lesions were more common in cases of HZO keratitis.

The most common complication of HSV keratitis in our study was recurrence, observed in 52 (67.53%) patients followed by neovascularization in 15 (19.48%) cases. Corneal opacity was seen in 10 (12.98%) patients. In HZO keratitis, trigeminal neuralgia was observed in 18 out of a total of 20 patients (90%). Neurotrophic keratitis was seen in 8 (40%) patients, corneal opacity in 7 (35%), and keratouveitis in 3 (15%) patients. Other complications encountered were neovascularization in 2 (10%) and glaucoma in 3(15%) patients.

Pramod[9] reported 137 cases presented with "first episode" of HSV keratitis and 97 with recurrent infection. Souza et al.[10] reported that corneal complications included opacification, neovascularization, and corneal thinning or perforation. In this series, postherpetic neuralgia was the most common complication after HZO keratitis. Ghaznawi et al.[11] reported that post-herpetic neuralgia, neurotrophic keratopathy, and secondary infectious keratitis were more frequent in the older patients ($P = 0.05$). Severson et al.[12] studied two hundred and two patients diagnosed as acute HZO from 1976 through 1998. Neurotrophic keratitis was the only complication that was less likely in the patients treated with antiviral drugs.

In this series, 49.09% patients did not report any cause for recurrence. Among the rest, maximum cases (25%) reported with fever before recurrence followed by common cold in 10.2%. Other possible causes for recurrence were the use of TEM such as gulab jal and milk (9%), and instillation of steroid drops for red eye (7.4%) while 5.8% patients had recurrence after their cataract surgery.

Kabra et al.[7] reported that 87 patients had one attack, 25 had two, 10 had three, and 5 had four or more attacks during the follow-up period from 1999 to 2003. 13 patients had used traditional eye medicine before reporting to their hospital. Khurana et al.[4] reported that 75 cases (65.8%) gave history of some precipitating cause before the onset of keratitis. The majority of cases gave history of malarial fever (64%). In our study, 10% patients reported upper respiratory tract infection (URTI) before an episode of recurrence. Darougar et al.[8] reported that association of URTI was found in 35% patients and systemic disorders such as mild fever in 31% patients. Bell et al.[6] observed fever and URTI as a precipitating factor for recurrence. Souza et al.[10] reported that among the HSV recurrence cases, 5 patients had systemic atopy, and two patients had severe ocular rosacea. Systemic immune disorders were noted in two patients.

CONCLUSION

Viral corneal ulcer is a very common and serious ocular disease. The incidence of viral keratitis in India has shown a steep rise due to improved socioeconomic changes and indiscriminate widespread use of antibiotics and corticosteroids. In this study, we found that HSV keratitis was more common in younger age group and HZO in the elderly age group. Males and those belonging to low socioeconomic status was more frequently affected, and incidence of HSV keratitis and HZO was more common in the months of May-August and August, respectively. Occupation wise, laborers were more affected with HSV keratitis while no occupational correlation was observed in HZO. Recurrence is quite frequent in patients with HSV keratitis with fever and common cold being the most common precipitating factors for recurrence. In our study, other factors responsible for recurrence were the use of TEMs and steroids. Patients with more than two episodes of recurrence of HSV keratitis showed subsequent decrease in visual acuity. To conclude, unavailability of diagnostic modalities at every place, and use of steroids, TEMs in rural areas increases visual morbidity. Hence, patient counseling in HSV keratitis is must during the 1st attack, regarding nature of disease, certain triggering factors, and importance of regular follow-ups.

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