

Ocular manifestation and visual outcomes in herpes zoster ophthalmicus: a prospective study from a tertiary hospital of Eastern India

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Abstract

• **AIM:** To estimate the magnitude of different ocular manifestation in clinically established herpes zoster ophthalmicus (HZO) patients and assessment of the visual outcome after two months of initial examination.

• **METHODS:** An observational prospective study was conducted on 42 clinically diagnosed Tzanck smear positive cases HZO to observe the occurrence and frequency of different ocular manifestation and their visual outcome in 10-month period with 2mo follow up. Full ophthalmological examination using slit lamp, non-contact tonometry, applanation tonometry, direct and indirect ophthalmoscope were performed.

• **RESULTS:** Out of 42 patients of HZO, 33 had one or more type of ocular manifestation starting from lid skin involvement to conjunctivitis, keratitis, uveitis, increased intraocular pressure (IOP) and optic neuritis but no retinal manifestation. More number of HZO cases and ocular manifestation were found with advancement of ages. Young HZO patients were more associated with human immunodeficiency virus (HIV) infection and HIV infected people with HZO infection had more ocular manifestation. Male to female ratio was 2:1 among HZO cases but ocular manifestation occurred more among males. Female with advanced age were involved more. Lid involvement (73.81%), conjunctivitis (69.05%), and keratitis (59.52%) were most common ocular manifestation followed by anterior uveitis (30.95%) and episcleritis (11.90%). Ocular hypertension (42.86%) was associated with almost every

ocular manifestation. Among the cases of more than 45 years of age, 9.52% patients acquired 6/6 vision compared to 7.14% patients at and below 45 years of age after 8wk of follow up.

• **CONCLUSION:** The visual outcomes are poor in HZO with advanced age group. Visual outcome of the affected eyes is poor than unaffected eyes. The loss of vision is mainly due to keratitis, anterior uveitis, posterior uveitis, and optic neuritis.

• **KEYWORDS:** herpes zoster ophthalmicus; conjunctivitis; episcleritis; keratitis; uveitis; optic neuritis; Hutchinson sign

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INTRODUCTION

Infection with varicella-zoster virus (VZV), a neurodermotropic virus causes varicella (chicken pox), a disease that manifests as a disseminated vesicular body rash after that the virus remains latent in sensory ganglia for decades which reactivated later under certain circumstance(s) and causes new symptoms herpes zoster (shingles). Herpes zoster ophthalmicus (HZO) is caused by activated double stranded VZV (type 3). The virus reactivated in dorsal root ganglion and retrograde migration to the sensory axon of the skin to form the painful vesicular eruption, crusting and heals within 2-6wk. It typically affects dermatome supplied by ophthalmic division of trigeminal nerve (5th cranial nerve) and unilateral in nature. It may be bilateral only in disseminated zoster seen in severely immune compromised patient. Deficient immune status of the host is a primary factor for virus reactivation.

Most of immune compromised patients including human immunodeficiency virus (HIV) positive patients are at risk develop HZO^[1]. Risk of VZV is 15 times greater in men with HIV than men without HIV^[2]. It usually develops in elderly patients due to depressed cellular immunity.

In HZO the reactivated virus descends from the trigeminal root ganglion (gasserian ganglion) through the ophthalmic nerve, which *via* different branches supplies the skin of forehead, the lids, the nose and the eyeball supra orbital and supra trochlear branches are nearly always involved, nasal branch are very frequently involved rarely infra orbital branch. Many cases of HZO exhibit a prodromal period of fever, malaise, headache, and eye pain prior to eruption of the skin rash. The patient may describe eye pressure, tearing, and eye redness, of decreasing vision. Pain in the trigeminal nerve distribution may be severe. Ocular manifestation is very common with HZO such as row of vesicular skin rash and scars in the forehead lids and lid adnexa, conjunctivitis, episcleritis and scleritis, keratitis, decreased corneal sensation, iridocyclitis, secondary glaucoma, retinal involvement, multiple ocular nerve involvement and marked visual impairment in various proportions. HZO associated uveitis is usually associated with high intraocular pressure (IOP). Hutchinson's sign was a powerful predictor of ocular inflammation and corneal denervation in HZO. The manifestations of herpes zoster skin lesions at the dermatomes of both nasociliary branches were invariably associated with the development of ocular inflammation. Zoster comes from Greek word zoster, meaning "belt" or "girdle", after the characteristic belt-like dermatomal rash. The common name for the disease, shingles, derives from the Latin cingulus, a variant of Latin cingulum meaning "girdle". VZV belongs to the same subfamily of the herpes virus group as HSV, the viruses are morphologically identical but antigenically distinct^[3]. The HZO diagnosis is clinical. It is easy in patients presenting with a typical vesicular rash, challenging when mimicked by vesicles caused by herpes simplex virus (HSV), and may be missed when skin eruptions are lacking (zoster sine herpette).

Zoster sine herpette (ZSH) refers to a condition of HZO cases in which dermatomal distribution pain occurs in the absence of an antecedent rash.

Post herpetic neuralgia (PHN) is a most important and troublesome complication, which is very tiring to the patient as well as to the physician and till date there is no single effective drug to cure this distressing problem. Acyclovir has been the oral antiviral agent approved for the treatment of patients with acute herpes zoster, its effect on post herpetic neuralgia remains controversial. Diabetic status of the patient was not checked but diabetes is the important factor in development of HZO. Pain is not included in the inclusion criteria though it is ominous sign for clinical diagnosis of the cases^[4-5].

The problem is that almost all HZO ocular manifestations are per se unspecific and often indistinguishable from those occurring for other causes in general and those caused by HSV infections in particular. Yet, there is one exception, VZV

epithelial keratitis. Clinically, it is the least troublesome of VZV ocular manifestations, but it occupies an outstanding position because of its typical features. VZV epithelial keratitis may precede the rash, accompany it, develop later on, and recur; in some patients, it may be the only clue revealing the true cause of their disease.

A number of HZO patients come to Hospital Out Patient Department (OPD) with different symptoms but many of them have only cutaneous symptoms without any ocular manifestation. Few ocular manifestations may have serious vision threatening outcome. Many patients are referred from skin OPD to eye OPD for checking of ocular manifestations.

So the main objective of the study was to find out magnitude of different ocular manifestations of HZO cases and to measure the visual outcome of the patients after two months and to find out the lacunae of different studies on the HZO cases and to determine the percentage of vision threatening ocular manifestation of HZO cases. But the biggest challenge of this study was to take consent from the patient for follow up on regular interval and to prevent drop out of patients from the study.

SUBJECTS AND METHODS

Ethical Approval A descriptive study with cross sectional design of data collection was conducted in the Departments of Ophthalmology and Dermatology, R.G. Kar Medical College and Hospital over a period of one year. Permission from Institutional Ethics Committee was obtained. Consent and detail history were taken in every patient.

Enrolment of patient was done for a period of 10mo as the visual outcome was assessed after 2mo. All clinically diagnosed cases of HZO from the OPD of ophthalmology and dermatology were included in the study. All HZO cases are Tzanck smear positive. Physical examination was included a thorough ophthalmologic exam including external inspection, visual acuity, visual fields, extra ocular movements, papillary response, funduscopy, IOP, anterior chamber slit lamp examination, and corneal examination with and without staining amongst others.

All patients were planned for full ophthalmological examination. This was carried out using slit lamp bio microscopy details examination of eye lid lashes, eye lid margins and adnexal area, states of conjunctiva, cornea including its epithelial integrity by fluorescent straining, corneal ulceration, status of anterior chamber, iris, papillary shape size and reaction to light, lens condition. Non-contact tonometry (NCT), applanation tonometry (AT). AT were done, if corneal epithelium is intact or there is no significant corneal oedema or blepharospasm. NCT was used where AT was not possible. Following that dilatation of pupil bilaterally with tropicamide eye drop and fundus examination were done

primarily by direct ophthalmoscope then 78/90 D Volk lens in slit lamp biomicroscope for examination of central fundus which includes optic disc macula including fovea and finally the peripheral fundus up to ora serreta check-up were done by indirect ophthalmoscopy. After initial visit ('0' date) every patient was examined after 3d, and at the end of 1st week from the first date of visit. Subsequent visits were conducted at the end of 2nd, 4th, 6th, and 8th week respectively.

After collection and compilation of data, it was subsequently analysed by using Graph Pad Software Inc., San Diego, CA, USA; 2007, Microsoft Word and Excel software.

RESULTS

Among the 42 cases of HZO, 28 (66.67%) were males and 14 (33.33%) were females. Among the total cases, majority of the patients belonged to the age group of 56 to 60y (21.42%). The younger age group (21-25y) was minimum (2.38%). As the age of the male patients was 24-65y and female patient was 37-70y, 45y was selected for "cut of age" between younger and older. It was also observed that the ocular manifestation became eminent with a class interval of 5y. Figure 1 nose the Hutchingson sign in an HZO case.

Out of 42 cases of HZO, only 11 cases were 45y or less (26.19%) and 31 cases were above 45y (73.81%). Out of total 11 cases of 45y or less, males were 10 (90.91%) and females were only 1 (9.09%). But among the cases of above the age group of 45y, males were 18 (58.06%) and females were 13 (41.94%). So, in lower age group gender distribution of HZO cases were male predominant in this study. The distribution of study population according to gender and age is depicted in Table 1.

Out of 42 cases of HZO, 33 (78.57%) cases were found to have ocular manifestation (Table 2). Among the total 33 HZO cases 24 cases were male (72.73%) and rest 9 (27.27%) were female. The female cases had higher cutaneous involvement *i.e.* 5 out of 9 cases (55.56%). Among the 11 cases of 45y or below, 6 (54.55%) cases had distinct ocular manifestation and among the 31 cases of above 45y 27 (87.10%) cases of higher age group had distinct ocular manifestation. It was observed that ocular manifestation was predominant in older age. Among the 6 cases of HZO with ocular manifestation in 45y or below age group male were 100% (6 cases out of 6) and female was 0 case. Among the 27 cases of HZO with ocular manifestation in higher age group males were 18 (66.67%) and females were 9 (33.33%).

Out of total 42 cases, 7 HIV positive cases were found. Out of total cases of 11 among 45y or below, 5 (45.45%) cases were HIV positive and out of total cases of 31 above 45y, only 2 cases (6.45%) were HIV positive. Out of 6 ocular manifested HZO cases of 45y or less, 4 cases (66.67%) were HIV positive and out of 27 ocular manifested HZO cases over 45y, only



Figure 1 Hutchingson's sign.



Figure 2 Skin of eye brow and adnexa involvement with conjunctivitis.

Table 1 Age and gender distribution of HZO cases n=42 (%)

Age	Male	Female	Total
21-30y	3 (10.71)	0	3 (7.14)
31-40y	5 (17.86)	1 (7.14)	6 (14.29)
41-50y	6 (21.43)	3 (21.43)	9 (21.43)
51-60y	10 (35.71)	7 (50)	17 (40.48)
61-70y	4 (14.29)	3 (21.43)	7 (16.67)
Total	28 (66.67)	14 (33.33)	42 (100)

2 cases (7.41%) were HIV positive. It was clearly observed that HIV status remained high in ocular manifested HZO cases at 45y or below age group. It was seen among the total 7 HIV positive HZO cases 6 cases have ocular manifestation (85.71%).

Out of total 42 cases HZO, conjunctivitis was noted among most of the patient (69.05%). It was followed by keratitis overall (59.52%), epithelial keratitis (45.24%), stromal keratitis (38.10%), nummular keratitis (33.33%), anterior uveitis (30.95%). Among the patients with lid involvement, 22 (52.38%) cases were male, and 9 (21.43%) cases were female (Figure 2, Table 3).

Ocular hypertension is associated with 18 cases of HZO with ocular manifestation among the total 33 cases (54.55%). IOP raised in 14 cases among total of 31 HZO cases over 45y (45.16%). Distribution of various ocular manifestations according to the age group and IOP were showed in Tables 4-5. In the present study it was seen that under 45y group vision 6/6 after 8wk was lower (7.14%) in comparison to over 45y (9.52%). Vision 6/9 was almost same (7.14%) as over 45y (7.14%). Visual outcome of affected and non-affected eyes at the end of 8wk were showed in Table 6.

DISCUSSION

Goh and Khoo^[6] found the mean age of herpes zoster in their

Table 2 Distribution of study population according to gender and ocular manifestation of herpes zoster cases *n=42 (%)*

Age	n	Ocular manifestation (n=33)		No ocular manifestation (n=9)	
		Male	Female	Male	Female
≤45y	11	6 (14.29)	0	4 (9.52)	1 (2.38)
>45y	31	18 (42.86)	9 (21.43)	0	4 (9.52)
Total	42	24 (57.14)	9 (21.43)	4 (9.52)	5 (11.9)

Table 3 Distribution of various ocular manifestations among the HZO cases *n=42*

Ocular manifestation	n (%)
Conjunctivitis	29 (69.05)
Keratitis overall	25 (59.52)
Epithelial keratitis	19 (45.24)
Stromal keratitis	16 (38.10)
Nummular keratitis	14 (33.33)
Disciform keratitis	8 (19.05)
Anterior uveitis	13 (30.95)
Posterior uveitis	2 (4.76)
Episcleritis	5 (11.90)
Optic neuritis	2 (4.76)
Lid involvement	31 (73.81)
Increased IOP	18 (42.86)

study to be 48.8y. Herpes zoster usually occurs in advancing of age due to lowering of the immunity power reactivating the long-term harbouring the varicella virus in the sensory ganglion. Brănișteanu *et al*^[7] found that 35% of patients were in the 70-80 years age. According to the study conducted by Abdul Latheef and Pavithran^[8] the incidence of herpes zoster was mainly in the fourth and third decades of life. A definite history of chicken pox was present in only 63.4% cases. In the majority (70%) herpes zoster occurred spontaneously. Another study was conducted by Ghaznawi *et al*^[9] where equal numbers of patients were affected with HZO in the younger and older age group. The most common decade of HZO onset was between 50 and 59y. Younger patients were more likely to be healthy compared with older patients. In our study it has also been shown that males are more affected than females. So herpes zoster is the male predominant disease. This is to some extent similar with different hospital-based clinical study of herpes zoster conducted by Adhicator and Agarwal^[10] where the herpes zoster cases included 71 males and 42 females and the male:female ratio was 1.69:1. In another study of Chandrakala and Tharini^[11], it was seen that out of 100 cases, 72 were males and 28 were females and the sex ratio was 2.5:1. Age wise distribution showed that 73 cases were below the age of 50 and 27 were above the age of 50y. Ten males were there out of 11 cases of HZO. The cause of high male dominance of HZO patients in younger age may be due associated HIV

positive status. This finding is close to study conducted by Opstelten *et al*^[12]. He showed that the incidence was greater in females in the middle-aged and youngest group. Gender effect was inverse in young adults. In our study only one person under 25y affected among the total 42 patients. In our study it is revealed that ocular manifestation of HZO is more with advancing age and female involvement also more with advancement of age, but male have more ocular manifestation irrespective of age group. Out of 6 oculars manifested HZO cases under and equal to 45y, 4 cases (66.67%) were HIV positive and out of 27 ocular manifested HZO cases over 45y only 2 cases (7.40%) were HIV positive. According to the study of Sandor *et al*^[13] HZO occurred with frequent ocular complications in a subgroup of adults distinguishable by their young age. Over the study duration, 21% (three of 14) of the AIDS-risk subgroup patients have developed AIDS with a 14% (two of 14) mortality.

In another study of by Adepogu *et al*^[14] 26 seropositive patients were in 20 to 49 years of age and half the patient had HZO manifestation. Maiya and Shenoy^[15] demonstrated that advancing age was the most common predisposing factor. Acute neuralgia and skin lesions were the most common modes of presentation. Ocular involvement was seen in 16 (59.25%) of the patients with HZO. Cornea was the commonest ocular structure (62.5%). It was also observable that disciform keratitis (19.04%) was near most half of the nummular keratitis incidence. Liesegang^[16] told that a nummular anterior stromal keratitis could develop, which usually resolved or became chronic. Puri *et al*^[17] reported that ocular manifestations in HZO were present on 68 patients. Among them pain (77.9%) was the commonest ocular complaint. Visual status was good in the majority (73.5%) of patients at presentation. Lid and adnexal findings (45.8%) were most common ocular involvement followed by conjunctivitis (41.1%). Corneal complication was seen in 38.2% of cases, uveitis in 19.1% and post-herpetic neuralgia and secondary glaucoma each in 5.8%. Yawn *et al*^[18] conducted a cohort study where 184 patients (9.0%) had eye involvement. Common eye complications were keratitis (76.2%), uveitis/iritis (46.6%) and conjunctivitis (35.4%). Recurrent keratitis and recurrent iritis/uveitis occurred in 6.9% and 7.4% respectively. Outcomes included six (3.3%) patients with new vision decrements to 20/200 or worse. Six (3.3%) individuals had lid ptosis. No one developed acute retinal necrosis (ARN). Significant visual outcome may not be expected from this study due to relatively small sample size, short time and other factors affective the visual outcome like cataract, macular pathology *etc.* are not excluded. This finding can be correlate with other studies like Kahloun *et al*^[19] where ocular manifestations included adnexal involvement (58.8%), keratitis (31.4%), keratouveitis (31.4%), isolated

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Table 4 Distribution of various ocular manifestations according to the age group

Age	n=42 (%)								
	Conjunctivitis	Epithelial keratitis	Stromal keratitis	Nummular keratitis	Disciform keratitis	Episcleritis	Anterior uveitis	Posterior uveitis	Optic neuritis
21-25y	1 (2.38)	0	0	0	0	0	0	0	1 (2.38)
26-30y	0	0	0	0	0	1 (2.38)	0	0	0
31-35y	1 (2.38)	1 (2.38)	1 (2.38)	1 (2.38)	1 (2.38)	1 (2.38)	0	0	0
36-40y	2 (4.76)	1 (2.38)	1 (2.38)	0	0	1 (2.38)	1 (2.38)	0	1 (2.38)
41-45y	2 (4.76)	2 (4.76)	1 (2.38)	1 (2.38)	0	1 (2.38)	2 (4.76)	0	0
46-50y	4 (9.52)	2 (4.76)	0	0	0	1 (2.38)	1 (2.38)	0	0
51-55y	5 (11.9)	3 (7.14)	4 (9.52)	4 (9.52)	1 (2.38)	0	2 (4.76)	1 (2.38)	0
56-60y	9 (21.42)	5 (11.9)	4 (9.52)	3 (7.14)	3 (7.14)	0	2 (4.76)	1 (2.38)	0
61-65y	3 (7.14)	3 (7.14)	3 (7.14)	3 (7.14)	2 (4.76)	0	3 (7.14)	0	0
66-70y	2 (4.76)	2 (4.76)	2 (4.76)	2 (4.76)	1 (2.38)	0	2 (4.76)	0	0

Table 5 Distribution of various ocular manifestations in HZO cases according to gender and IOP

Ocular manifestation	n=42 (%)			
	Total cases (n=33)		High IOP (n=18)	
	Male (n=24)	Female (n=9)	Male (n=14)	Female (n=4)
Lid involvement	22 (52.38)	9 (21.43)	13 (30.95)	4 (9.52)
Conjunctivitis	20 (47.62)	9 (21.43)	13 (30.95)	4 (9.52)
Epithelial keratitis	13 (30.95)	6 (14.29)	9 (21.43)	3 (7.14)
Stromal keratitis	11 (26.19)	5 (11.9)	8 (19.47)	3 (7.14)
Nummular keratitis	11 (26.19)	3 (7.14)	8 (19.47)	2 (4.76)
Disciform keratitis	7 (16.67)	1 (2.38)	6 (14.29)	1 (2.38)
Episcleritis	5 (11.9)	0	4 (9.52)	0
Anterior uveitis	9 (21.43)	4 (9.52)	8 (19.47)	3 (7.14)
Posterior uveitis	1 (2.38)	1 (2.38)	1 (2.38)	1 (2.38)
Optic neuritis	2 (4.76)	0	2 (4.76)	0

Table 6 Visual outcome of affected and non-affected eyes at the end of 8wk

Groups		n=42 (%)						
		Best corrected visual acuity						
		6/6	6/9	6/12	6/18	6/24	6/36	≤6/60
Affected eyes	≤45y	3 (7.14)	3 (7.14)	2 (4.76)	2 (4.76)	1 (2.38)	0	0
	>45y	4 (9.52)	3 (7.14)	8 (19.04)	6 (14.29)	3 (7.14)	5 (11.09)	2 (4.76)
Non affected eyes	≤45y	6 (14.29)	3 (7.14)	1 (2.38)	0	0	1 (2.38)	0
	>45y	7 (16.67)	10 (23.81)	6 (14.29)	1 (2.38)	2 (4.76)	3 (7.14)	2 (4.76)

anterior uveitis (29.4%), IOP elevation (23.5%), oculomotor nerve palsy (5.8%), and optic neuritis (1.9%). Isolated anterior uveitis, isolated keratitis ($P=0.001$), and IOP elevation were more likely to be concomitant to HZO active skin disease, while keratouveitis occurred more likely more than 1mo after HZO eruption. Anterior uveitis and keratouveitis were more likely to be associated with age ≥ 50 y. Ocular complications included neurotrophic keratopathy (1.9%), corneal opacity (5.9%), secondary glaucoma (7.8%), optic atrophy (1.9%), and post herpetic neuralgia (13.3%). Mean follow-up was 12mo. Mean final best corrected visual acuity was 20/32; it was $\geq 20/40$ in 78.4% of the eyes. Szeto *et al*^[20] conducted a retrospective study where ocular manifestations were present in 170 (65.6%) patients. Conjunctivitis was the most common ocular manifestation, followed by anterior uveitis and keratitis.

After resolution of HZO, 58.7% of patients had a visual acuity of 6/12 or worse. Epithelial keratitis and stromal keratitis were independent risk factors for visual loss after resolution of HZO. Another study conducted by Nithyanandam *et al*^[21] where overall visual outcome was good, with 36/64 (56.3%). The mild, moderate, and severe visual loss occurred in 22/64 (34.3%), 3/64 (4.7%), and 3/64 (4.7%) respectively. Moderate to severe visual loss was due to severe uveitis, neurotrophic keratitis, and cataract. Increasing age was significantly associated with visual loss. Uveitis was found to be the best predictor of visual loss in HZO on multivariate analysis. Viral retinitis was a rapidly progressive condition that may involve the entire retina and lead to severe loss of vision. The aetiological agents include cytomegalovirus (CMV), VZV, HSV, and rarely Epstein-Barr virus (EBV). ARN may

occur in immune-competent individuals and is characterised by confluent, peripheral, necrotising retinitis, peripheral occlusive arteritis and moderate-to-severe vitritis. Progressive outer retinal necrosis usually occurs in immune-compromised patients and can lead to the rapid involvement of the peripheral and central retina by full thickness necrosis with severe loss of vision from retinal detachment and optic neuropathy. In our study we did not find a single case of retinal involvement. Forster *et al*^[22] reported two patients, both seropositive for the HIV, developed rapidly progressive retinal necrosis associated with a systemic herpes zoster infection.

Kumar *et al*^[23] conducted a study on 35 patients where 28.57% cases were in age group 41-50y and the male cases were 54.28%. The patients were followed on 7, 14, 30d and 3mo after first visit. So, the frequency of the visit was less than the present study. According to them conjunctivitis (77.1%) and corneal involvement (60%), episcleritis (8.6%), uveitis (57.1%), and secondary glaucoma (5.7%) were common manifestations of HZO. Hutchinson's signs was positive in 18 cases. Corneal involvement and uveitis with Hutchinson's signs were observed in 48.57% and 14.28% cases respectively. The 57.14% patients had no visual loss at 3mo follow up, and 85.71% had vision 6/18 or better. But they did not report any association with HIV^[23].

Niederer *et al*^[24] reported ocular involvement of HZO in 84.8% cases. In his study corneal involvement, uveitis, and vision loss (<20/50) were found in 51.2%, 47.6%, and 9.6% cases respectively. But this retrospective cohort study had certain limitations like subjective or recall bias. Another study was conducted by Tuli^[25] where follicular conjunctivitis was reported as the commonest manifestation of HZO. Zheng *et al*^[26] conducted a retrospective cohort study including 87 673 patients above 50y (from 2010 to 2018). They compared the characteristics HZO and non HZO among herpes zoster patients and factors associated with ocular manifestations by an automated natural processing algorithm. They found 9% ocular herpes zoster cases among all HZO cases. But the study design was devoid of direct patient contacts or follow up. Li^[27] conducted a study on HZO includes acute keratitis as an ocular manifestation and permanent vision loss due to it. Early diagnosis and management by oral and topical antiviral medication may help to reduce the potentially devastating complication.

The present study reported that the HZO cases occurred more in advanced of age group (73.80% patients were above 45 years of age). The 78.57% patients of HZO had ocular manifestations. Ocular manifestations of HZO cases were also common above 45y (87.09% cases). Young patients were affected more with associated HIV infection (45.45%) and at the same time the HIV positive HZO cases also suffered more

with ocular manifestations (85.71%). HZO cases were twice common among males (66.67%). Ocular manifestations were observed more in males (72.72%). All female patients were over 45 years of age. Ocular hypertension was associated with almost every type of ocular manifestations and IOP raised in 54.54% patients with ocular manifestations. IOP was also more in elderly patients (45.16%). Ocular manifestations were lid involvement (73.80%), conjunctivitis (69.04%), episcleritis (11.90%), keratitis (59.52%), anterior uveitis (30.95%), posterior uveitis (4.76%). Four types of keratitis were found in the study: keratitis (45.23%), stromal keratitis (38.09%), nummular keratitis (33.33%), and disciform keratitis (19.04%). Retinal involvements were not found in this study. Visual outcome was poor in the affected eye of elderly patient (>45y) and was associated with keratitis, anterior uveitis, posterior uveitis and optic neuritis primarily.

The present study depicts the scenario of HZO cases and its ocular manifestation in a tertiary hospital in Eastern India. It also helps to generate a clear conception regarding the type of ocular manifestations and magnitude of ocular manifestations in HZO patients of Eastern India. The causes of vision threatening consequences of HZO patients, type and magnitude of keratitis associated with HZO, relation between raised IOP and HZO, relation with HIV positive cases are also revealed. This study can help the clinician and ophthalmologist in their judgement and presumptive assessment of the HZO cases in OPD.

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REFERENCES

- 1 Bowling B. Kanski's Clinical Ophthalmology, 8th edition. Basic and clinical science course, section 8 2011-12, American Academy of Ophthalmology. Philadelphia:Elsevier; 2016;119-122.
- 2 Yawn BP, Itzler RF, Wollan PC, Pellissier JM, Sy LS, Saddier P. Health care utilization and cost burden of herpes zoster in a community population. *Mayo Clin Proc* 2009;84(9):787-794.
- 3 Papagianni M, Metallidis S, Tziomalos K. Herpes zoster and diabetes mellitus: a review. *Diabetes Ther* 2018;9(2):545-550.
- 4 Plouffe JF, Silva J Jr, Fekety R, Allen JL. Cell-mediated immunity in diabetes mellitus. *Infect Immun* 1978;21(2):425-429.
- 5 Delamaire M, Maugendre D, Moreno M, Le Goff MC, Allannic H, Genetet B. Impaired leucocyte functions in diabetic patients. *Diabet Med* 1997;14(1):29-34.
- 6 Goh CL, Khoo L. A retrospective study of the clinical presentation and outcome of herpes zoster in a tertiary dermatology outpatient referral clinic. *Int J Dermatol* 1997;36(9):667-672.
- 7 Brănișteanu DE, Stoleriu G, Oanță A, Dorobăț CM, Petrariu FD, Anchidin DM, Ciubotaru FM, Brănișteanu DC. Clinical-epidemiological trends of herpes zoster: a 5-year study. *Rev Med Chir Soc Med Nat Iasi* 2014;118(3):817-822.

- 8 Abdul Latheef EN, Pavithran K. Herpes zoster: a clinical study in 205 patients. *Indian J Dermatol* 2011;56(5):529-532.
- 9 Ghaznawi N, Viridi A, Dayan A, Hammersmith KM, Rapuano CJ, Laibson PR, Cohen EJ. Herpes zoster ophthalmicus: comparison of disease in patients 60 years and older versus younger than 60 years. *Ophthalmology* 2011;118(11):2242-2250.
- 10 Adhicari DP, Agarwal DK. A hospital-based clinical study of herpes zoster-a report of 113 cases. *IOSR Journal of Dental and Medical Sciences* 2017;16(1):33-38.
- 11 Chandrakala C, Tharini GK. A clinical study on 100 cases of herpes zoster in a tertiary care hospital Department of Dermatology, Government Villupuram Medical College Hospital, Villupuram, Tamil Nadu, India. *International Journal of Scientific Study* 2017;9:113-116.
- 12 Opstelten W, Van Essen GA, Schellevis F, Verheij TJ, Moons KG. Gender as an independent risk factor for herpes zoster: a population-based prospective study. *Ann Epidemiol* 2006;16(9):692-695.
- 13 Sandor EV, Millman A, Croxson TS, Mildvan D. Herpes zoster ophthalmicus in patients at risk for the acquired immune deficiency syndrome (AIDS). *Am J Ophthalmol* 1986;101(2):153-155.
- 14 Adepoju FG, Olawumi HO, Adekoya BJ. HIV seropositivity and related eye diseases in Uith, Ilorin. *Niger Postgrad Med J* 2007;14(2):163-165.
- 15 Maiya AS, Shenoy S. A clinical study of herpes zoster ophthalmicus. *IOSR Journal of Dental and Medical Sciences* 2013;12(6):9-13.
- 16 Liesegang TJ. Corneal complications from herpes zoster ophthalmicus. *Ophthalmology* 1985;92(3):316-324.
- 17 Puri LR, Shrestha GB, Shah DN, Chaudhary M, Thakur A. Ocular manifestations in herpes zoster ophthalmicus. *Nepal J Ophthalmol* 2011;3(2):165-171.
- 18 Yawn BP, Wollan PC, St Sauver JL, Butterfield LC. Herpes zoster eye complications: rates and trends. *Mayo Clin Proc* 2013;88(6):562-570.
- 19 Kahloun R, Attia S, Jelliti B, Attia AZ, Khochtali S, Yahia SB, Zaouali S, Khairallah M. Ocular involvement and visual outcome of herpes zoster ophthalmicus: review of 45 patients from Tunisia, North Africa. *J Ophthalmic Inflamm Infect* 2014;4:25.
- 20 Szeto SK, Chan TC, Wong RL, Ng AL, Li EY, Jhanji V. Prevalence of ocular manifestations and visual outcomes in patients with herpes zoster ophthalmicus. *Cornea* 2017;36(3):338-342.
- 21 Nithyanandam S, Stephen J, Joseph M, Dabir S. Factors affecting visual outcome in herpes zoster ophthalmicus: a prospective study. *Clin Exp Ophthalmol* 2010;38(9):845-850.
- 22 Forster DJ, Dugel PU, Frangieh GT, Liggett PE, Rao NA. Rapidly progressive outer retinal necrosis in the acquired immunodeficiency syndrome. *Am J Ophthalmol* 1990;110(4):341-348.
- 23 Kumar G, Kumar R, Bhadani UP, Paudel V. Study of ocular manifestations and factors affecting visual outcome in herpes zoster ophthalmicus. *IOSR Journal of Dental and Medical Sciences* 2020;19(6):15-21.
- 24 Niederer RL, Meyer JJ, Liu K, Danesh-Meyer HV. Herpes zoster ophthalmicus clinical presentation and risk factors for loss of vision. *Am J Ophthalmol* 2021;226:83-89.
- 25 Tuli SS. Herpes zoster ophthalmicus (HZO) keratitis. *Infections of the Cornea and Conjunctiva*. Singapore: Springer Singapore, 2020:211-224.
- 26 Zheng C, Sy LS, Tanenbaum H, Tian Y, Luo Y, Ackerson B, Tseng HF. Text-based identification of herpes zoster ophthalmicus with ocular involvement in the electronic health record: a population-based study. *Open Forum Infect Dis* 2021;8(2):ofaa652.
- 27 Li JY. Herpes zoster ophthalmicus: acute keratitis. *Curr Opin Ophthalmol* 2018;29(4):328-333.