
Epidemiological study of chemical and thermal ocular injuries at a rural hospital in eastern Maharashtra

Manjunath Patil* and Leena Ambarkar

Department of Ophthalmology, Ashwini Rural Medical College and Research Center, Kumbhari, Solapur, India

***Correspondence Info:**

Dr. Manjunath Patil

Assistant Professor

Department of Ophthalmology,

Ashwini Rural Medical College and Research Center, Kumbhari, Solapur, India

E-mail: drmanjunath2000@yahoo.com

Abstract

Chemical and thermal injuries to the eye may be rare incidence but are not uncommon and pose one of the challenging areas of practice for ophthalmologists irrespective of area of practice. The present study was undertaken in department of ophthalmology at Ashwini Rural Medical College and Research Center, Kumbhari, Solapur between 1st Jan 2013 to 31 Dec 2014, which is over a period of 2 years. A total 40 patients were included in the study after counseling and written informed consent was also taken individually in each case. Every possible details regarding the injury including- Sociodemographic factors, chemical nature of agent, mode of injury, duration lapsed between injury and presentation to hospital were recorded on a pretested Proforma.

Males and students were most commonly affected by ocular injuries. Lime is a common agent causing ocular chemical injury. Children (1-10 years) were relatively most commonly affected age group. Chemical injuries due to alkaline lime were most common cause for ocular injury.

Keywords: Ocular Injury, Chemical Burns, Thermal Burns, Sociodemographic Factors

1. Introduction

Chemical and thermal injuries to the eye may produce extensive damage to the ocular surface epithelium cornea and anterior segment resulting in permanent visual impairment. There is no published literature as to Sociodemographic patterns of ocular injuries from Eastern Maharashtra. As the conventional medical methods in the management of ocular burns have met with only a limited success, it remains one of the challenging entities facing the clinician today.[2] One of the recent approaches to treating these patients is amniotic membrane transplantation. It was utilized in the eye for the first time, way back in 1940 by De Roth[3] but it disappeared from the literature, until in 1995, when Kim and Tseng[4], showed that the amniotic membrane facilitated the corneal surface reconstruction in rabbits after epithelial removal and limbal keratectomy.

2. Materials and Methods

In the present study conducted, 57 patients with ocular chemical and thermal burns, who visited IJBR (2015) 6 (09)

the ophthalmology department, were evaluated in detail. Out of the 57 patients, 17 patients had grade I ocular burns (Roper Hall classification) were excluded from the study. Rest 40 patients after counseling agreed to enroll into the study. While the emergency measures of giving a thorough saline wash and atropinisation were carried out, details regarding the chemical nature of the agent, the mode of injury and presentation were enquired.

During emergency treatment, patient's eye was examined for, visual acuity, lid injury, conjunctival hyperemia, necrosis, limbal ischemia, corneal haze, pupil size and reaction, iris pattern; IOP was checked digitally after ruling out perforation. The patient's were classified according to Roper Hall classification.

Patients were evaluated in details for visual acuity, lid edema, size of the epithelial defect, congestion of the eye, symblepharon, conjunctivalization and vascularization of cornea, sclera necrosis, ischemia in perilimbal zone, corneal melting, IOP (assessed digitally), pupil size and

reaction, iris pattern, lens for any evidence of cataract and schirmer test was performed

3. Results

18 patients (45%) were in the age group of 1-10 years. It can also be seen 12 patients (30%) were in the relatively young age group i.e. 11-20 years (Table 1) 28 males (70%) and 12 female (30%) were affected with the ocular and thermal injuries (Table 2) 97.5% of injuries were unilateral and only 2.5% of the cases were bilateral. (Table 3) Majority of the patients were school going students (50%), followed by service-men (25%) (Table 4) Out of 34 patients having chemical ocular burns, all were exposed to lime (Table 6)

Table 1: Age Distribution of the Cases

Age groups	No. of cases	% of cases
1-10 years	18	45
11-20 years	12	30
21-30 years	6	15
31-40 years	2	5
41-50 years	2	5
Total	40	100

Table 2: Sex Distribution of cases

Sex	No. of cases	% of cases
Male	28	70
Female	12	30
Total	40	100

Table 3: Laterality of the Eye affected

Laterality of the eye affected	No. of cases	% of cases
Right eye	14	35
Left eye	25	62.5
Both eyes	01	2.5
Total	40	100

Table 4: Occupation of the cases

Occupation	No. of cases	% of cases
Students	20	50
Service	10	25
Factory worker	2	5
Farmer	2	5
House wife	2	5
No job	4	10
Total	40	100

Table 5: Type of Injury

Type of injury	No. of cases	% of cases
Chemical	34	85
Thermal	6	15
Total	40	100

Table 6: Nature of the chemical

Chemical agent	No. of eyes	% of cases
Acid	0	0
Alkali lime	34	100
Others	0	0
Total	34	100

Table 7: Grading of injury (Hughes classification)

Grade	No. of cases	% of cases
II	8	20
III	14	35
IV	18	45
Total	40	100

4. Discussion

Chemical and thermal injuries of the eye may produce extensive damage to the ocular surface epithelium, cornea and anterior segment, resulting in permanent visual impairment.[5] These injuries may lead to delayed epithelization of the ocular surface, persistent inflammation and progressive tissue melting. Healing may occur with neovascularisation, conjunctivalisation. Conjunctival involvement too may lead to scarring, symblepharon formation and tear film deficiency.[6] As conventional methods in the management of ocular burns have met with only a limited success, it remains one of the most challenging entities facing the clinician today.

In this study, majority of the population group was young. It was observed that in the present study, children were exposed to lime injury due to accidental bursting of plastic lime tubes, used by some adult relative, who was addicted to lime mixed tobacco chewing. These children became the victims of the adult relatives' tobacco with lime chewing addiction. In contrast, Margan[2] reviewed 221 chemical injuries and reported that majority of the patients were between the age group of 16 and 25 years. Similarly, Kuckelkorn[7] reviewed 236 chemically injured eyes and most patients were between the age of 16 and 45 years; only 7% were children. Thus, the working adult age group was affected the most in both these studies and industrial accidents accounted for more than 60% of these injuries. In contrast, in this study, it was observed that most of the accident occurred at home (household accidents), and that the children and the adolescent age group (1-20 yrs) were primarily affected.

In the present study, 28 males (70%) and 12 female (30%) were affected with the ocular and thermal injuries (Table 2). However, 10 (83.33%) out of the 12 females were under the age of 10 years. In the study carried out by Morgan[2] 75.6% were male. Similarly, Kuckelkorn[7] observed that 70% of patients with chemical injured eyes were male. This clearly indicates that males are at higher risk of chemical and thermal injuries to the eyes. In this study, 97.5% of injuries were unilateral and only 2.5% of the cases were bilateral as shown in Table 3. Left eye was more commonly affected (62.5%), than the right eye (35%). This preponderance of the left eye has been noted in the present study.

In this study, majority of the patients were school going students (50%), followed by servicemen (25%); farmers, factory workers and housewives were 5% each. 10% of the patients were too young to go to school, which is shown in Table 4. In this study, 34 patients (85%) were exposed to chemical injury and 15% of patients (n=6) were post-thermal burns as shown in Table 5. Hence, in the present study chemical injuries to the eye were commoner than thermal injuries. In the study carried out by Meller *et al*[8] only 23% of the eyes had thermal burns. While 77% had chemical burns, which again indicates that chemical injuries are commoner than thermal injuries.

In this study, all of the cases were accidental. All the injuries occurred at home except two (5%) thermal injuries, which occurred at the work place (industrial accident). Kuckelkorn[7] observed that accidents accounted for 98% of injuries, out of which 61% were due to industrial accidents and 37% were due to household accidents. At home, most of the injuries were caused by lime and drain cleaners. In the present study, out of 34 patients having chemical ocular burns, all were exposed to lime as shown in Table 6. Tobacco chewing is a common habit in this part of the country. Tobacco is often mixed with lime and then chewed. This lime is sold at the pan-shops and is commonly available in plastic tubes. Accidental squeezing or rupture of these plastic lime tubes caused ocular lime burns. Children became the victims of the adult relative's lime with tobacco chewing addiction. Other studies also showed that lime is the most common alkali causing ocular injury, though other agents also caused ocular injury in some patients.

Only grade II and more severe ocular burns (Roper Hall classification) were included in this study. Out of the 40 patients selected, 8(20%) patients had grade II ocular injuries; 14 (35%) patients had grade III ocular injuries and 18 (45%) patients had grade IV injuries (Table 8). Thus the severe grade IV ocular injuries were commoner than the milder grade II injuries. The results were similar to the ones observed by Meller *et al*[8] in which 46% were grade IV injuries, 31% were grade III injuries and 23% were grade II injuries.

5. Conclusion

Males and students were most commonly affected by ocular injuries. Lime is a common agent causing ocular chemical injury. Children (1-10 years) were relatively most commonly affected age group. Chemical injuries due to alkaline lime were most common cause for ocular injury. Children become the victims of ocular lime burns because of some adult relatives' lime mixed tobacco chewing habit. Injuries occurred were more of severe grade i.e. grade III and IV.

References

- [1] Beare JD. Eye injuries from assault with chemical *Br. J Ophthalmol* 1990;74:514-518.
- [2] Margan SJ. Chemical burns of the eye causes and management. *Br. J Ophthalmol* 1987;71: 854-857.
- [3] De Roth A. Plastic repairs of conjunctival defects with fetal membrane. *Arch Ophthalmol* 1940; 23: 522-525.
- [4] Kim JC, Tseng SCG. Transplantation of preserved human amniotic membrane for surface reconstruction of severely damaged rabbit corneas. *Cornea* 1995;14:473-484.
- [5] Wagoner MD. Chemical injuries of the eye: Current concepts in pathophysiology and therapy. *Surv Ophthalmol* 1997;41:275-313.
- [6] Pfister RR. Chemical injuries of the eye. *Ophthalmology* 1983; 90: 619-633.
- [7] Kuckelkorn R, Luff I, Kottek AA, *et al.* chemical and thermal burns in the residential area of RWTH Archen. *Kin Monatsloll Augenheilled* 1993; 203: 34-42.
- [8] Meller *et al.* Amniotic membrane transplantation for acute chemical or thermal burns. *Ophthalmology* 2000;107: 980-990.