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Original research article

A CLINICAL STUDY OF OCULAR SEQUELAE IN THERMAL AND CHEMICAL BURNS

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Abstract

A prospective clinical Study of 50 patients with thermal and chemical burns admitted in the burns ward, Government General Hospital, Guntur from March 2023 to August 2023 was done. Data regarding patients' age, sex, type of burns with percentage, and presenting features were recorded. All patients were enquired about the history of presenting illness, type of burns, and previous ocular history. A detailed clinical examination and posterior segment evaluation, wherever feasible was done. Follow-up for four months to find out sequelae and their management was done.

Results: In this study of 50 patients with thermal and chemical burns, 5% are below 10 years, 16% are 11 - 20 years, 45% are 21 - 30 years, 23% in 31- 40 years, 4% are between 41- 50 years, 5% are between 51-60 years and 2% are above 60 years, 64%male and 36% female, 74% thermal burns and 26% chemical burns, 86% Eyebrow, 88% Eyelids, 82% Conjunctiva, 56% Cornea,1% Lens, 1% Fundus, 64% Lacrimal apparatus.

Conclusion: This prospective study of 50 patients who were presented with thermal and chemical burns showed that the 21-30 years (45%) age group is commonly involved, affecting males (64%) more commonly than females, thermal burns (74%) were more common than chemical, eyelids (88%) were the most common structure affected.

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Introduction

- Ocular burns may constitute an ophthalmic emergency. The severity of the injury depends on multiple factors. These factors include the offending agent, length of exposure, the surface area affected, and which ocular tissues are involved.
- Moderate to severe burns of the eye and the ocular adnexa cause serious morbidity and may result in long-term consequences on both vision and quality of life.
- Burns of the eye and ocular adnexa can be divided into two general categories, thermal and chemical. There are important distinctions between these two categories in how the injury progresses immediately after the injury.
- Tissue damage from thermal burns quickly abates once the heat energy is no longer in contact with the patient or after the source loses its thermal energy.
- Common examples of these mechanisms include patients removing themselves from a house fire and a flash burn from an explosion or fireworks injury. Due to the blink reflex and the protective nature of the ocular adnexa, the skin of the eyelids may receive most of the damage from thermal injuries.
- Direct thermal burns to the ocular surface typically cause superficial injury due to brief contact time. Common causes of thermal ocular burns include hot water, hot cooking oil, and a flame, as seen in an explosion or a fire.
- Chemical burns to the eye require more aggressive initial management. The tissue damage may persist and extend deeper into the ocular structures as long as the chemical remains in contact with the eye and ocular adnexa.
- Chemical burns may occur from exposure to everyday household items such as cleaner, laundry or dish detergent, bleach, and ammonia. Injuries also occur with industrial exposures to fertilizers, industrial acids, lye, lime, and cement. Fireworks and other explosions can cause both thermal and chemical injuries.

Ocular sequelae of thermal and chemical burns are

1. Corneal epithelial disruption or defect.
2. Limbal ischemia due to occlusion of limbal vasculature.
3. Corneal stromal oedema due to breakdown and precipitation 0f glycosaminoglycans.
4. Corneal ulcer with or without impending perforation.
5. Corneal perforation.
6. Corneal neo-vascularisation due to loss of limbal cells.
7. Corneal opacification.
8. Exposure keratopathy.
9. Conjunctival Xerosis, Symblepharon.
10. Cicatricial entropion, lagophthalmos.
11. Meibomian dysfunction, lacrimal punctum stenosis.
12. Macular hole.

To prevent long-term complications i.e., corneal scarring, permanent vision loss, phthisis bulbi due to burns injury involving eye and ocular adnexa, a thorough clinical examination and regular follow-up of prognosis, of the abovementioned diseases due to thermal and chemical burns is required.

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Aims and Objectives

This study aims to evaluate the ocular sequelae of thermal and chemical burns injury involving the eye and the ocular adnexa among patients coming to a tertiary healthcare centre i.e., the government general hospital, Guntur.

Materials and Methods

A prospective study was performed in patients presenting with ocular manifestations of thermal and chemical burns at a government general hospital, Guntur with detailed clinical examination and regular follow-up of prognosis.

- Data regarding patients' age, sex, type of burns with percentage, and presenting features were recorded in patients who presented in the government general hospital, Guntur.
- All patients were enquired about the history of presenting illness, type of burns, Ocular history, and past history.
- All patients were subjected to local examination, and detailed ocular examination i.e., eyebrows, eyelids, conjunctiva, cornea, anterior chamber, iris, pupillary margin, and its reaction to light, lens, and posterior segment examination wherever possible.
- Visual acuity testing with Snellen’s chart was done.
- Slit lamp biomicroscope was done to examine the anterior segment
- Fluorescein staining of the cornea and examination under cobalt blue light was done.
- Fundus examination was done.

Inclusion criteria

- All Patients presented with burns injuries involving eye and ocular adnexa to GGH, Guntur.
- Patients presented with only thermal and chemical burns injuries.
- Age > 5 years.
- Patients who were willing to participate in the prospective study.
- Patients signed with informed consent.

Exclusion criteria

- Age < 5 years.
- Patients presented with other burns injuries i.e., electrical burns.
- Patients with a history of ocular diseases such as pre-existing ocular surface disorders.
- Patients who were not willing to participate in the prospective study.

Results

Age distribution

Of 50 patients in this study, 5% are below 10 years, 16% are 11 - 20 years, 45% are 21 - 30 years, 23% in 31- 40 years, 4% are between 41- 50 years, 5% are between 51-60 years and 2% are above 60 yrs.

The most common age group involved is 21-30 years (45%).

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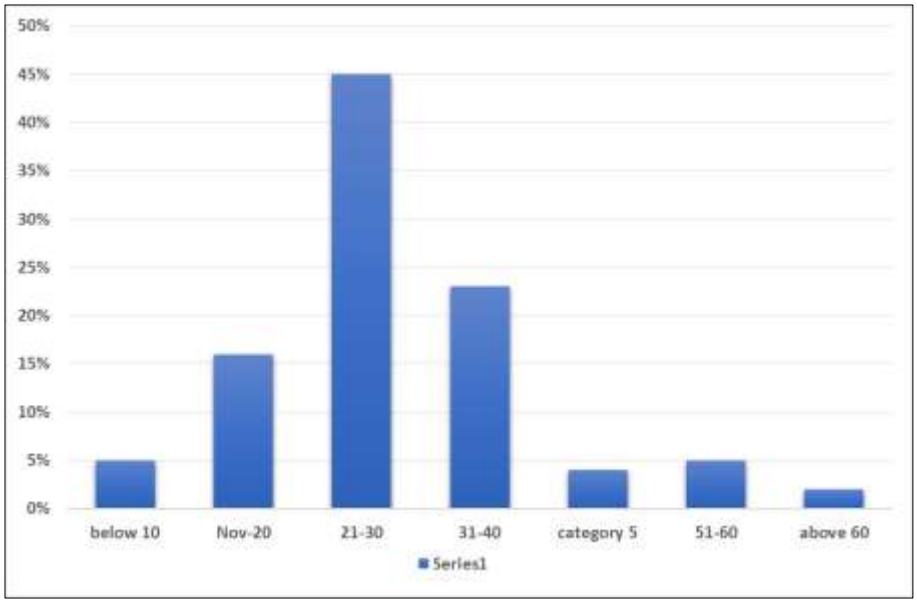

Fig 1: Age distribution

Sex distribution

Of 50 patients, 32 patients (64%) were males, and 18 (36%) patients were females.

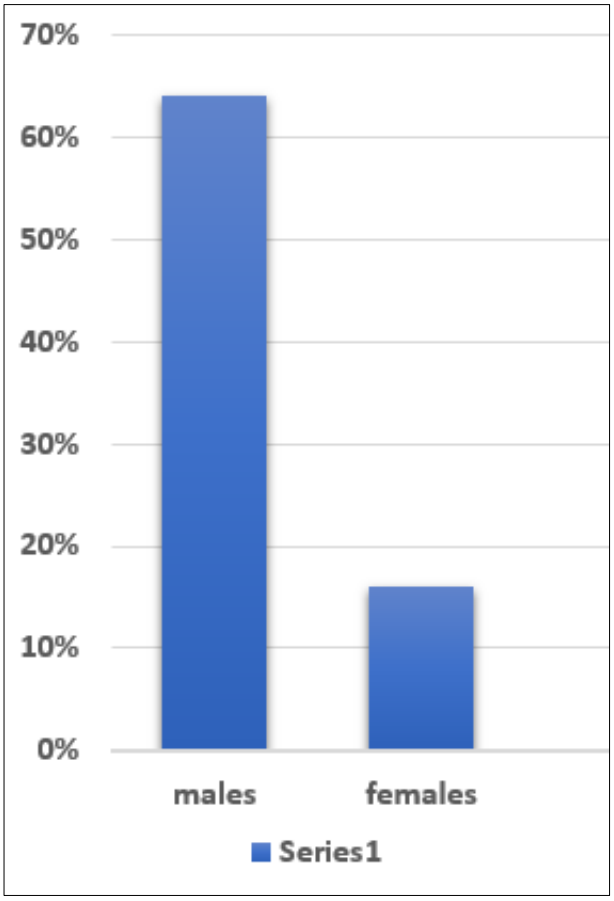

Fig 2: Sex distribution

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024

Nature of burns

Of 50 patients, 37 (74%) patients had thermal burns, and 13 (26%) had chemical burns. In thermal burns, 27 patients had burns due to petroleum products like kerosene and petrol, 6 had burns due to hot oil, and 4 with fall of hot water and steam. In chemical burns, 9 had alkali burns, and 4 had acid burns.

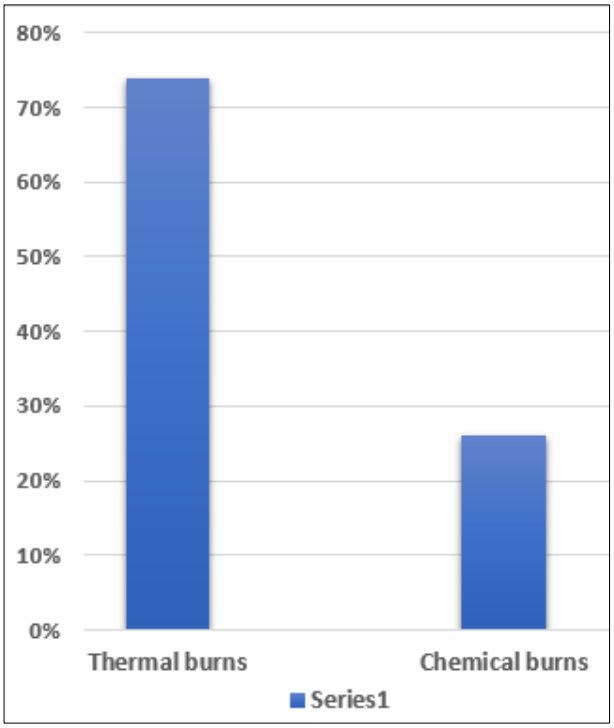

Fig 3: Nature of burns

Percentage of sequelae in various ocular structures

- Eyebrow - 86% - Loss of eyebrows.
- Eyelids -88% - Ectropion, canthal webbing, Trichiasis, Distichiasis, Lagophthalmos.
- Conjunctiva - 82% Xerosis, Symblepharon.
- Cornea - 56% - Xerosis, Corneal opacity.
- Lens - 1% - Cataract.
- Fundus -1% - Macular hole.
- Lacrimal apparatus - 64%- Misdirected punctum, Stenosis, Scarring.

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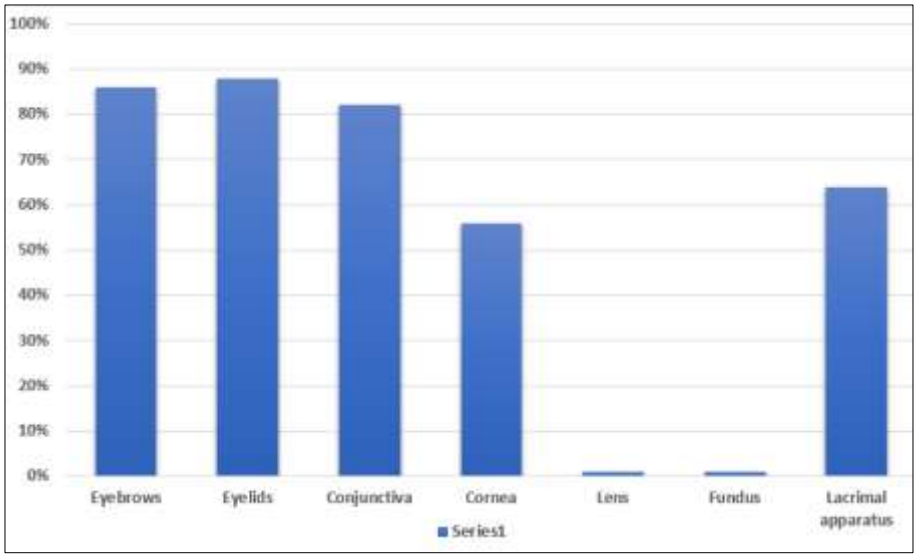

Fig 4: Percentage of sequelae in various ocular structures

Discussion

- Burns of the eye and ocular adnexa can be divided into two general categories, thermal and chemical.
- Due to the blink reflex and the protective nature of the ocular adnexa, the skin of the eyelids may receive most of the damage from thermal injuries. Direct thermal burns to the ocular surface typically cause superficial injury due to brief contact time. These thermal burns can be expectantly managed like other superficial corneal injuries.
- Chemical burns to the eye require more aggressive initial management. The tissue damage may persist and extend deeper into the ocular structures as long as the chemical remains in contact with the eye and ocular adnexa. Therefore, chemical ocular burns require intervention to remove the insult and prevent ongoing damage to the ocular surface and deeper structures.
- Two classification systems have been developed to assess prognosis based on early assessment and burn features. The Roper-Hall classification tool uses corneal clarity and the amount of limbal ischemia to provide a grade from I-IV. Dua's classification system uses the number of limbal clock hours involved and the percent of conjunctival involvement to provide a grade from I to VI. The higher the number, the poorer the prognosis for both classification systems.

Three distinct clinical phases

- Immediate, acute (0 to 7 days).
- Early reparative (7 to 21 days).
- Late reparative (after 21 days).

Management during the acute phase (days 0 to 7) and early reparative phase (days 8 to 21) is directed at suppressing inflammation and promoting ocular surface re-epithelialization. A topical antibiotic ointment and preservative-free artificial tears may be sufficient for mild injuries. More severe injuries require frequent monitoring for complications like ocular surface exposure from adnexal scarring, corneal or stromal

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024

thinning, and elevated intraocular pressure. Topical steroids are used to decrease inflammation. Topical cycloplegic agents can be valuable in managing pain. Systemic pain medication may be needed in addition to topical therapy during the acute phase.

Preservative-free artificial tears are used through all stages of healing. Systemic tetracyclines (doxycycline 20 to 50 mg PO twice daily) and vitamin C (1,000 mg PO daily) are prescribed to promote wound healing.

Preservative-free topical antibiotics for infection prophylaxis may be started. Avoid aminoglycosides like topical gentamicin and tobramycin as these are particularly toxic to the corneal epithelium. Erythromycin ophthalmic ointment is well-tolerated, readily available, and a good choice for initial infection prophylaxis.

Medications to decrease intraocular pressure may be needed throughout the continuum of care. Elevated intraocular pressure can impair corneal healing in the acute and early reparative phases and must be treated aggressively. Chronically elevated intraocular pressure can damage the optic nerve resulting in glaucomatous vision loss.

More severe burns will require more specialized therapies such as topical biologics, including autologous serum and platelet-rich plasma drops. Bandage contact lenses are helpful for corneal epithelial defects and are very useful in modulating pain from exposed corneal nerves. Early amniotic membrane transplant and tenonplasty can be done to promote re-epithelialization in severe scleral melting or ischemia cases.

During the late reparative phase (>21 days), management involves controlling inflammation, rehabilitation, and reconstructing the ocular surface. Conjunctival limbal autograft can restore limbal stem cells to provide healthy supporting tissue in anticipation of keratoplasty. Different types of keratoplasty can be performed depending on the depth of corneal scarring. The goal of keratoplasty is to improve visual function. If needed, symblepharon release and forniceal and lid reconstruction will occur during the late reparative phase in persistent ocular surface exposure, loss of other functions, or cosmesis

Conclusion

The current prospective study of 50 patients who were presented with thermal and chemical burns involving ocular structures at the government general hospital, Guntur showed that the 21-30 years (45%) age group is commonly involved, affecting males (64%) more commonly than females, thermal burns (74%) were more common than chemical, eyelids (88%) were the most common structure affected following which eyebrows (86%), conjunctiva (82%), lacrimal apparatus (64%), cornea (56%), lens (1%) and fundus (1%) were equally affected.

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ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024

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