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ORIGINAL RESEARCH

Profile of Eye Injuries in Patients Examined at a Tertiary Eye Care Center in Peru

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Purpose: This study aimed to evaluate the profile of eye injuries in patients treated at the Emergency Room of the National Institute of Ophthalmology 'Dr. Francisco Contreras Campos' in 2023.

Patients and Methods: This cross-sectional, descriptive, and retrospective study was conducted in patients diagnosed in 2023 with eye injuries at the Emergency Room of the National Institute of Ophthalmology "Dr. Francisco Contreras Campos", in Lima - Peru.

Results: A total of 413 patients with eye injuries were evaluated, the majority were men (78.2%) and young adults (74.5%). The majority of injuries (79.9%) were mechanical in origin, with foreign bodies being the most common cause (53.8%) and type of injury (39.5%). 97.3% received pharmacological treatment, 7% surgical treatment, and 83.3% other treatments. Most patients (80.2%) maintained their pre-treatment visual acuity, and 12.5% saw improvements.

Conclusion: Mechanical injuries, particularly those involving foreign bodies, are the most common. Topical medication, particularly lubricants and antibiotics, are the primary pharmacological treatments. The majority of patients preserve their visual acuity following the intervention.

Plain Language Summary: Despite the clinical importance of eye injuries, most studies have not focused on describing non-mechanical injuries, those affecting the adjacent structures, the mechanism and context of the injury. Our study evaluated the profile of eye injuries in patients treated at a tertiary ophthalmological center and found that the most common eye injuries are those of mechanical origin, whose mechanism and type of injury is due to a foreign body, while in those of non-mechanical origin it is due to a chemical agent, the main treatment is pharmacological and most patients maintain their visual acuity after treatment. The results of this study allow optimizing the treatment and prevention strategies for eye injuries, which could facilitate more precise and effective care in the daily practice of ophthalmologists.

Keywords: eye injuries, foreign bodies in the eye, visual acuity

Introduction

Eye injuries pose a significant health problem due to their high incidence and the associated disease burden. In 2019, 59,933 incident cases occurred, and 438,000 years lived with disability were reported worldwide.[1] Even in high-income countries, the prevalence of eye injuries is 7.5 per 100 people, contributing to the burden of disability and blindness.[2] Traffic accidents and social conflicts have increasingly contributed to this burden in recent decades.1 During the COVID-19 pandemic, the overall incidence of eye injuries decreased; however, household injuries specifically increased, while sports and outdoor injuries declined.[3]

Eye injuries can affect the eyeball and surrounding structures, such as the eyelashes, eyelids, and lacrimal glands[4] and may have a mechanical or non-mechanical origin, including chemical, thermal, radiative, or electrical causes.[5–7] Foreign bodies,

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exposure to mechanical forces and falls are the primary causes of the global burden of eye injuries.[1] Men and young adults are the most affected,[1,2] and eye injuries can result in loss of activity for at least 1 day, hospitalization, visual impairment, or blindness.[8]

Studies have addressed eye injuries in specific contexts, such as sports-related incidents,[9,10] fireworks,[11] facial fractures,[12] healthcare practice,[13] prone positioning in critically ill patients,[14] and occupational exposures.[15] According to recent literature, the risk of developing an eye injury varies significantly depending on the country, occupation, and period analyzed.[15]

The Birmingham Eye Trauma Terminology is widely used to classify mechanical injuries.[16,17] However, its use has been questioned due to limitations in categorizing other types of injuries, such as those affecting the periocular structures,[4] and non-mechanical injuries, including chemical injuries.[4,6] These limitations highlight the need for more comprehensive and integrated classification systems.[18]

A comprehensive review of medical records from multiple hospitals has revealed the presence of both mechanical and non-mechanical ocular and periocular lesions.[19,20] Although research has been conducted in tertiary care centers, the available literature offers limited information on periocular lesions or injuries of non-mechanical origin.[21,22] The following data are presented to provide a comprehensive overview of the subject.

Insufficient information exists on eye injuries in Peru.[21] Statewide hospital records of eye trauma, including the mechanism and context of the injury, are essential for guiding prevention strategies and improving visual outcomes.[23] This study aimed to evaluate the profile of eye injuries in patients treated at the emergency room of the National Institute of Ophthalmology 'Dr. Francisco Contreras Campos' in 2023.

Materials and Methods

Study Design and Setting

This cross-sectional, descriptive, and retrospective study was conducted in the emergency department of the National Institute of Ophthalmology "Dr. Francisco Contreras Campos" (INO), a tertiary care center and national reference center for eye health in Peru.

Participants

The study included patients treated for ocular injuries in the INO Emergency Department between January and December 2023, with no age restrictions or other exclusion criteria. These criteria were applied given the exploratory and descriptive nature of the study, which allows for capturing the heterogeneity of ocular injuries. The sample size was calculated using OpenEpi, assuming an infinite population, a 50% expected frequency, a 5% precision, and a 95% confidence level, resulting in a required sample of 384 participants. Sampling was performed through simple randomization. Finally, a total of 413 participants (90 women and 323 men) were included in this study, with a median age of 38 years (interquartile range: 23–50).

Variables and Data Source

The variables were categorized into sociodemographic, injury-related, and clinical characteristics. The sociodemographic variables were gender, age group, place of origin, and type of health insurance. The injury-related variables were location,[7,23] origin,[5–7] and mechanism of eye injury.[19,20,23] The clinical variables were laterality, type of eye injury,[19,20,23] last care received since emergency admission, pharmacological, medical and surgical treatments, as well as uncorrected visual acuity. Data were obtained from patients' medical records.

Procedures

Following approval by the INO Institutional Research Ethics Committee and institutional authorization, the Statistics Office was requested to provide all chart numbers of patients treated in an emergency setting for eye injuries during 2023, considering the corresponding codes according to the International Classification of Diseases version 10 (ICD-10). Thus, 10,189 medical record numbers were obtained and entered into the WinEpi program, with the indication that 384 numbers should be randomly selected, regardless of characteristics such as age or sex. Subsequently, the 384 medical records were reviewed for compliance with the selection criteria, but some did not meet the selection criteria; therefore, a second selection of numbers was necessary using the same methodology. The unselected numbers were entered again into the WinEpi program, with the indication that 194 numbers

should be randomly selected. Trained medical professionals extracted the data on sociodemographic, contextual, and clinical characteristics of eye injury using standardized forms. Confidentiality was ensured through a coding system. The collected data were entered into the designated database for analysis.

Ethical Aspects

The study was reviewed and approved by the INO Institutional Research Ethics Committee (027–2024-CIEI-INO) and adheres to the Declaration of Helsinki. Informed consent was not required, as data were obtained from the medical records. Confidentiality was maintained by assigning a code to each participant, accessible only to researchers. The study results did not allow participant identification.

Statistical Analysis

Statistical analysis was performed using the Stata 16 version. Qualitative variables were summarized as absolute frequencies and percentages, whereas numerical variables were reported as means and standard deviations if normally or approximately normally distributed; otherwise, interquartile ranges were used. The Shapiro–Wilk test was employed to assess the distribution of numerical variables, with a p value of 0.05 considered significant.

Results

During 2023, a total of 10,189 emergency department visits were recorded for potential eye injuries. Of these, 578 medical records were randomly selected and reviewed. After applying the eligibility criteria, 165 records were excluded because they did not correspond to true ocular trauma cases. Therefore, the final study sample consisted of 413 patients diagnosed with eye injuries. Subsequent analyses were based on subsets of this population, depending on data availability. The sociodemographic characteristics, context of eye injuries and clinical features of 413 patients with eye injuries were analyzed. The pharmacological, medical and surgical treatment of 402, 344 and 29 patients were analyzed, respectively. Furthermore, the uncorrected visual acuity of only 343 eyes was compared before and after treatment, covering a total of 315 patients, since both visual acuity values were available.

Among the 413 patients with eye injuries, 78.2% were men, 74.5% were young adults, 89.1% were from Metropolitan Lima, and 70% had comprehensive health insurance (Table 1). The location of eye injury was not documented in 49.9%

Table 1 Sociodemographic Characteristics of Patients Treated for Eye Injury

Sociodemographic Characteristics		**N = 413 Patients**	
		n	**%**
Gender	Male	323	78.2
	Female	90	21.8
Age, years		38	23–50
Age group	Childhood (0–11 years)	43	10.4
	Adolescent (12–17 years)	18	4.4
	Young (18–29 years)	77	18.6
	Adult (30–59 years)	231	55.9
	Senior (≥60 years)	44	10.7
Place of origin	Metropolitan Lima	368	89.1
	Lima provinces	6	1.5
	Other departments	38	9.2
	Not registered	1	0.2
Type of health insurance	Comprehensive Health Insurance	289	70.0
	EsSalud	63	15.3
	Private	49	11.9
	Armed Forces and Police Forces	6	1.5
	Not registered	6	1.5

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of the patients; however, industrial settings (21.1%) and housing (12.6%) were the most frequently reported locations. Of the examined patients with eye injuries, 79.9% had mechanical injuries, whereas 12.8% had non-mechanical chemical injuries. Foreign bodies were the leading cause (53.8%) of eye injuries, followed by injuries from impact with an object (17.2%) (Table 2).

Of the total patients (N = 413), 47.2% had an injury in the right eye, 39.5% presented with a foreign body on the ocular surface, and 29.3% exhibited a superficial injury on the eye and ocular adnexa. Notably, 77% of the patients received definitive treatment on the same day of admission to the emergency department. Approximately 97.3% of these patients received drug treatment, 7% underwent surgery, and 83.3% received other forms of treatment (Table 3).

The type of treatment received by the patients with eye injuries was analyzed. In cases of bilateral injuries, the treatment was similar in both eyes. In patients who received pharmacological treatment (N = 402), lubricant eye drops were the most frequently used medication (82.8%), followed by chloramphenicol (76.6%) and ketorolac (47.3%). Moreover, 344 patients underwent additional medical procedures, with foreign body removal (43.6%) and ocular irrigation (14.3%) being the most common (Table 4). Furthermore, 29 patients underwent surgery, with conjunctival wound suturing (34.5%) being the most prevalent procedure, followed by eyelid wound suturing (20.7%) (Table 5).

Table 2 Contextual Characteristics of Eye Injuries

Contextual Characteristics		**N = 413 Patients**	
		n	**%**
Place of occurrence	Industrial settings	87	21.1
	Housing	52	12.6
	Street/road	33	8.0
	Construction sites	20	4.8
	Sports facilities	10	2.4
	Public buildings	2	0.5
	Agricultural land	2	0.5
	Field	1	0.2
	Not registered	206	49.9
Origin of the injury	Mechanical	330	79.9
	Non-mechanical, chemical	53	12.8
	Non-mechanical, thermal	12	2.9
	Non-mechanical, radiation or electrical	6	1.5
	Not registered	12	2.9
Mechanism of injury	Foreign body	222	53.8
	Blown against an object	71	17.2
	Fighting/assault	24	5.8
	Burn	12	2.9
	Fall	6	1.5
	Cutting or piercing objects	6	1.5
	Vehicle related	3	0.7
	Other cactus milk	10	2.4
	Other types of glue	8	1.9
	Other types of bleach	7	1.7
	Other forms of light exposure	6	1.5
	Other types of antifungal drops	5	1.2
	Other types of caustic soda	5	1.2
	Other types of animal aggression	5	1.2
	Other types of cement	5	1.2
	Others	11	2.7
	Not registered	7	1.7

Table 3 Clinical Features of Patients with Eye Injuries

Clinical Features		N = 413 Patients	
		n	%
Laterality	Unilateral right eye	195	47.2
	Unilateral left eye	184	44.5
	Bilateral	34	8.2
Type of injury	Foreign body on ocular surface	163	39.5
	Superficial eye and ocular adnexa lesion	121	29.3
	Eye and ocular adnexa contusion	55	13.3
	Eye and ocular adnexa burnt	41	9.9
	Open wounds in the eyeball and the ocular adnexa	33	8
Last care since emergency admission	On the same day	318	77
	1–7 days	41	9.9
	From 8 to 30 days	40	9.7
	From 1 month to 3 months	5	1.2
	From 3 months to 6 months	8	1.9
	From 6 months to 1 year	1	0.2
Pharmacological treatment	No	11	2.7
	Yes	402	97.3
Surgical treatment	No	384	93.0
	Yes	29	7.0
Other treatments	No	69	16.7
	Yes	344	83.3

Table 4 Pharmacological and Medical Treatment Received by Patients with Eye Injuries

Treatment	n	%
Pharmaceuticals (N = 402 patients)		
Antibiotics		
Chloramphenicol	308	76.6
Ciprofloxacin	23	5.7
Moxifloxacin	17	4.2
Oxytetracycline + polymyxin B	20	4.9
Doxycycline	7	1.7
Amoxicillin and clavulanic acid	2	0.5
Dicloxacillin	2	0.5
Tobramycin	2	0.5
Corticosteroids		
Prednisolone	15	3.7
Hydrocortisone	3	0.8
Dexamethasone	2	0.5
Fluorometholone	1	0.3
Nonsteroidal anti-inflammatory drugs		
Ketorolac	190	47.3
Nepafenac	28	7
Ibuprofen	24	6
Naproxen	2	0.5

(*Continued*)

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Table 4 (Continued).

Treatment	n	%
Antiglaucomatous		
Timolol	5	1.3
Brimonidine	4	1
Dorzolamide	4	1
Acetazolamide	1	0.3
Mydriatics and cycloplegics		
Tropicamide	10	2.5
Atropine	9	2.2
Analgesics and antipyretics		
Paracetamol	38	9.5
Other		
Lubricants	333	82.8
Vitamin C	4	1
Other procedures (N = 344 patients)		
Foreign body removal	150	43.6
Eye wash	49	14.2
Eye patch	25	7.3
Therapeutic contact lenses	2	0.6
De-epithelialization of the affected area	2	0.6
Subconjunctival blood injection	1	0.3

Table 5 Surgical Treatment Received by Patients with Eye Injuries

Intervention	N = 29 Patients	
	n	%
Conjunctival wound suturing	10	34.5
Palpebral wound suturing	6	20.7
Palpebral wound suturing + tear duct cannulation	5	17.2
Vitrectomy	3	10.3
Corneal wound suturing	2	6.9
Scleral wound suturing	2	6.9
Corneal wound suturing + vitrectomy	1	3.4

The evolution of visual acuity after treatment was assessed in a sample of 343 eyes. The proportion of patients with a visual acuity of >20/40 increased from 72.9% to 76.7%, as well as the proportion of patients with a visual acuity <20/60 to ≥20/200 (from 5.2% to 6.1%). However, the proportion of patients with a visual acuity between 20/40 and ≥20/60 decreased from 13.7% to 11.1%, as well as the proportion of patients with a visual acuity of <20/200 to ≥20/400 (from 2.3% to 1.2%) and those with a visual acuity <20/400 (from 5.8% to 5.0%).

Patients with better initial visual acuity (>20/40) had a higher frequency of vision preservation (98.4%), followed by those with a visual acuity of <20/400 (80%). Patients with pre-treatment visual acuity between <20/200 and ≥20/400 exhibited greater variability after treatment (Table 6).

Post-treatment visual acuity was assessed in a sample of 343 eyes, categorized by the origin and mechanism of injury. Uncorrected visual acuity was classified as lower or higher if there was a decrease or increase of at least one line on the Snellen chart, respectively. Non-mechanical eye injuries had a higher frequency of decreased visual acuity after treatment compared with mechanical eye injuries (9.5% vs 6.6%). In three types of eye injuries, the proportion of patients with improved visual acuity after treatment exceeded that of patients with worsened visual acuity: superficial injuries to the

Table 6 Changes in Uncorrected Visual Acuity After Treatment (N = 343 Eyes)

Uncorrected Visual Acuity before Treatment	Uncorrected Visual Acuity after Treatment									
	>20/40		<20/40 to ≥20/60		<20/60 to ≥20/200		<20/200 to ≥20/400		<20/400	
	n	%	n	%	n	%	n	%	n	%
>20/40	246	98.4	4	1.6	0	0	0	0	0	0
<20/40 to ≥20/60	10	21.3	34	72.3	3	6.4	0	0	0	0
<20/60 to ≥20/200	3	16.7	0	0	14	77.8	1	5.6	0	0
<20/200 to ≥20/400	1	12.5	0	0	3	37.5	3	37.5	1	12.5
<20/400	3	15	0	0	1	5	0	0	16	80

Table 7 Uncorrected Visual Acuity After Treatment According to Origin and Type of Ocular Lesion (N = 343 Eyes)

Origin and Type of Eye Injury		Uncorrected Visual Acuity (VA) after Treatment					
		Lower VA (n = 25)		Equal VA (n = 275)		Higher VA (n = 43)	
		n	%	n	%	n	%
Origin of injury	Mechanical	17	6.6	207	79.2	35	13.5
	Non-mechanical	8	9.5	68	81	8	9.5
Type of injury	Foreign body on ocular surface	4	3	127	94.1	4	3
	Superficial eye and ocular adnexa lesion	2	2.3	75	87.2	9	10.5
	Contusion of the eye and its ocular adnexa	4	9.5	26	61.9	12	28.6
	Burns to the eye and ocular adnexa	6	11.8	39	76.5	6	11.8
	Open wounds in the eyeball and ocular adnexa	9	31	8	27.6	12	41.4

eye and ocular adnexa (10.5% vs 2.3%), eye and ocular adnexa contusions (28.6% vs 9.5%), and open wounds in the ocular adnexa and eyeball (41.4% vs 31%). However, for injuries involving foreign bodies on the ocular surface and burns confined to the eye and ocular adnexa, the rates of improved and worsened visual acuity were equal (Table 7).

Discussion

The study population consisted primarily of adult men, and most injuries were of mechanical origin, particularly foreign bodies on the ocular surface. Industrial settings were the most frequently documented place of occurrence. The majority of patients received same-day pharmacological treatment, and only a small proportion required surgical intervention. In the eyes assessed after treatment, most maintained or improved their initial visual acuity.

The higher prevalence of eye injuries in men and adults aligns with the findings of previous studies,[1,19–22] suggesting increased exposure to hazardous occupational environments and high-risk recreational activities. In recent years, the incidence of these injuries has decreased in both sexes [(1, 19)], partly due to the use of protective eyewear in occupational settings. However, strengthening preventive strategies in sports and domestic contexts remains essential.[24] In our study, 14.4% of eye injuries occurred in the pediatric population, highlighting the importance of a multifactorial preventive approach to eye protection in children. Restricting certain consumer products, such as the use of seat belts and laminated windscreens in vehicles, and educating children and caregivers on eye safety could help reduce these incidents.[25]

The industrial setting and housing emerged as the most frequent sites of eye injuries, aligning with findings from other studies.[7,22,26] These studies indicated that workplace accidents and domestic incidents accounted for a considerable number of eye injuries. A systematic review emphasized the importance of documenting the mechanism and context of eye injuries.[23] However, 49.9% of medical records lacked information on the location of eye injury occurrence. Mechanical injuries accounted for 79.9% of eye injuries, consistent with previous studies[5,7] that identified foreign bodies and blunt trauma[1,5,9,20] as the predominant mechanisms of eye injuries across diverse populations. In contrast, 12.8% of eye injuries were of chemical origin, although no differentiation was made between acid and alkali injuries. However,

other studies have indicated that alkali injuries pose a greater risk, as they penetrate beyond the ocular surface and damage internal structures, whereas acid injuries induce rapid coagulation, limiting tissue damage.[6]

Foreign bodies on the ocular surface and superficial injuries to the eye and its ocular adnexa were the most prevalent types of eye injuries, reinforcing the role of foreign bodies as the primary cause of injury. These findings are consistent with those of previous studies[19,20] but differ from a study that reported contusions or abrasions as the most common injury.[5] These discrepancies may be attributed to variations in the characteristics of the studied populations, exposure environments, and occupational or recreational activities. Many of these injuries could be prevented with the use of appropriate eye protection, especially in activities involving material handling or work that generates debris or flying particles, such as welding, farming, metalworking, and construction.[27]

Approximately 77% of patients were last seen on the day of their admission to the emergency department, whereas 9.9% had a hospital stay of 1–7 days. This finding aligns with the results reported in another study, which documented a hospital stay of 0–7 days in 64.8% of patients.[22] The short duration of medical care suggests that most eye injuries were mild or moderate and could be managed with initial interventions. However, it may also indicate an underestimation of the need for follow-up care. Facilitating timely access to specialized ophthalmologic services for complex cases and educating patients about warning signs that require further consultation remain essential.

The most commonly used medications were lubricant eye drops, chloramphenicol, and ketorolac. Lubricant eye drops not only manage dry eye but also facilitate wound healing, thus reducing pain and inflammation.[28] Chloramphenicol, a broad-spectrum topical antibiotic used to treat common bacterial eye infections, remains widely utilized. However, concerns exist regarding the long-term increase in bacterial resistance to this drug due to its frequent use as an over-the-counter medication.[29] Ketorolac, a nonsteroidal anti-inflammatory drug, effectively controls post-traumatic inflammation without the side effects associated with steroids, such as increased eye pressure and cataract formation.[30]

The removal of foreign bodies was a common medical procedure along with ocular irrigation. This is understandable as foreign bodies are a frequent cause of eye injury and often require intervention to remove them and prevent complications such as infectious keratitis, corneal leukoma, minor iritis, and corneal ulceration (rare cases).[31–33] Ocular irrigation helps remove foreign bodies or irritating substances, especially in cases of exposure to chemicals or external particles.[4,6] On the contrary, the need for surgical intervention was low. However, conjunctival wounds represented the greatest need for surgical management. Small conjunctival lacerations (<10 mm) can heal without surgery, but larger conjunctival lacerations (>10 mm) and poorly approximated lacerations typically require suturing.[34]

At admission, 72.9% of the patients had a visual acuity better than 20/40, and 80.2% maintained this level of acuity after treatment, with 12.5% showing improvement, consistent with the reports of other studies.[35,36] Mechanical injuries showed a higher frequency of improved visual acuity (13.5%) compared with non-mechanical injuries (9.5%). Patients with foreign bodies on the ocular surface and burns confined to the eye and its ocular adnexa showed similar rates of improved and decreased visual acuity after treatment, but other types of injuries had a higher percentage of improved visual acuity post-treatment. Studies have reported that open-globe injuries have a worse visual prognosis than closed-globe injuries, as well as injuries to the ocular globe than to the adnexa,[22,37,38] however, in this study it is difficult to analyze the change in visual acuity according to the type of injury, since the classification did not consider these categories. Additionally, chemical injuries from alkaline substances can cause deep and progressive damage to ocular tissues, compromising visual recovery.[6] Intraocular foreign bodies can lead to significant visual loss, making early detection essential, especially in the presence of clinical signs such as conjunctival or scleral continuity and a positive Seidel sign.[4,39]

This study has some limitations due to its retrospective design, which is susceptible to incomplete data in medical records. Although this may have limited a more detailed contextual interpretation, the findings still contribute to understanding the clinical and demographic profile of eye injuries. Information bias is a concern, as variability may exist in how different healthcare professionals record and report the characteristics of eye injuries. Although a random sampling strategy was applied to ensure feasibility, the findings are based on a subset of all emergency cases and are not intended to estimate population-level incidence or prevalence. However, the study offers a structured and systematic analysis of the characteristics and management of eye injuries within the institutional context. Additionally, selection bias is a potential issue, as the findings presented are based solely on data from a single national eye care center. Therefore, the findings may have limitations when extrapolated to healthcare facilities at other levels of care.

This study describes the specific characteristics of ocular injuries reported in a tertiary ophthalmology center, which may contribute to more appropriate and effective clinical care. The findings can support the development of the diagnostic and treatment protocols and guide preventive strategies targeting the most common risk factors. At the public health level, the information generated can support resource planning, the design of educational campaigns, and the implementation of targeted interventions. Therefore, the results of this study provide a basis for improving both ophthalmologic practice and preventive actions in vulnerable populations.

Conclusions

In conclusion, mechanical injury is the most common type of eye injury, with foreign bodies on the ocular surface being the predominant cause. Topical medication, particularly lubricants and antibiotics, are the primary pharmacological treatments. Most patients maintain their visual acuity after treatment and the progression of visual acuity varies based on the origin and type of eye injury. Occupational safety regulations, especially in industrial settings, need to be improved, with timely interventions and follow-up needed to prevent long-term visual impairment.

Abbreviations

INO, National Institute of Ophthalmology; J-STOPMetS, Japan Study of Treatment of Obesity in Metabolic Syndrome; ID, Identification; EMA, European Medicines Agency; WHO, World Health Organization; UV, Ultraviolet; IQR, Interquartile range.

Data Sharing Statement

This study is not a clinical trial; its design is cross-sectional, descriptive and retrospective. The database is available and anonymized upon request to the authors.

Consent for Publication

Not applicable. As this is a retrospective study, informed consent was not required. In addition, there are no images, videos, recordings, etc., that require consent for publication.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

References

1. Li C, Fu Y, Liu S, et al. The global incidence and disability of eye injury: an analysis from the global burden of disease study 2019. *eClinicalMedicine*. 2023;62:102134. doi:10.1016/j.eclinm.2023.102134
2. Swain T, McGwin G. The prevalence of eye injury in the United States, estimates from a meta-analysis. *Ophthalmic Epidemiol*. 2020;27(3):186–193. doi:10.1080/09286586.2019.1704794
3. Liang H, Zhang M, Chen M, Lin TPH, Lai M, Chen H. Ocular trauma during COVID-19 pandemic: a systematic review and meta-analysis. *Asia-Pac J Ophthalmol Phila Pa*. 2022;11(5):481–487. doi:10.1097/APO.0000000000000539

4. Heath Jeffery RC, Dobes J, Chen Fk. Eye injuries: understanding ocular trauma. *Aust J Gen Pract*. 2022;51(7):476–482. doi:10.31128/AJGP-03-21-5921
5. McGwin G, Owsley C. Incidence of emergency department-treated eye injury in the United States. *Arch Ophthalmol*. 2005;123(5):662–666. doi:10.1001/archopht.123.5.662
6. Dua HS, Ting DSJ, Al Saadi A, Said DG. Chemical eye injury: pathophysiology, assessment and management. *Eye*. 2020;34(11):2001–2019. doi:10.1038/s41433-020-1026-6
7. Zhang YX, Feng K, Liao MY, Yan H. Comparison of ocular trauma between normalized and the COVID-19 epidemic periods in China: a multi-center cross-sectional study. *Int J Ophthalmol*. 2023;16(1):10–15. doi:10.18240/ijo.2023.01.02
8. Négrel AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiol*. 1998;5(3):143–169. doi:10.1076/opep.5.3.143.8364
9. Hoskin AK, Watson S, Kamalden TA. Badminton-related eye injuries: a systematic review. *Inj Prev*. 2023;29(2):116–120. doi:10.1136/ip-2022-044564
10. Kim EJ, Ganga A, Rana VK, Greenberg PB. Basketball- associated eye injuries: a systematic review. *R I Med J*. 2013;106(2):40–42.
11. Wisse RPL, Bijlsma WR, Stilma JS. Ocular firework trauma: a systematic review on incidence, severity, outcome and prevention. *Br J Ophthalmol*. 2010;94(12):1586–1591. doi:10.1136/bjo.2009.168419
12. Magarakis M, Mundinger GS, Kelamis JA, Dorafshar AH, Bojovic B, Rodriguez ED. Ocular injury, visual impairment, and blindness associated with facial fractures: a systematic literature review. *Plast Reconstr Surg*. 2012;129(1):227–233. doi:10.1097/PRS.0b013e3182362a6d
13. Jordi AS, Chávez Méndez MA. Associated factors and types of eye injuries occurring in dentistry practice: systematic review. *Rev Cient Odontol*. 2023;11(3):e169. doi:10.21142/2523-2754-1103-2023-169
14. Patterson TJ, Currie P, Williams M, Shevlin C. Ocular injury associated with prone positioning in adult critical care: a systematic review and meta-analysis. *Am J Ophthalmol*. 2021;227:66–73. doi:10.1016/j.ajo.2021.02.019
15. Nowrouzi-Kia B, Nadesar N, Sun Y, Gohar B, Casole J, Nowrouzi-Kia B. Types of ocular injury and their antecedent factors: a systematic review and meta-analysis. *Am J Ind Med*. 2020;63(7):589–599. doi:10.1002/ajim.23117
16. Kuhn F, Morris R, Witherspoon CD. Birmingham Eye Trauma Terminology (BETT): terminology and classification of mechanical eye injuries. *Ophthalmol Clin N Am*. 2002;15(2):139–143. doi:10.1016/S0896-1549(02)00004-4
17. Kuhn F, Morris R, Witherspoon CD, Mester V. The Birmingham eye trauma terminology system (BETT). *J Fr Ophtalmol*. 2004;27(2):206–210. doi:10.1016/S0181-5512(04)96122-0
18. Shah M, Shah S, Agrawal R, Patel K. Validation of a modified Birmingham eye trauma terminology classification for mechanical eye injuries. *Trauma*. 2017;2017(9):1–4. doi:10.1177/1460408617715488
19. McGwin G, Hall TA, Xie A, Owsley C. Trends in eye injury in the United States, 1992–2001. *Invest Ophthalmol Vis Sci*. 2006;47(2):521–527. doi:10.1167/iovs.05-0909
20. McGwin G, Xie A, Owsley C. Rate of eye injury in the United States. *Arch Ophthalmol*. 2005;123(7):970–976. doi:10.1001/archopht.123.7.970
21. Díaz-Mendoza JJ, Chirinos-Saldaña MP, Uribe-Villarreal J, Hilario-Vargas J, Adrianzén RE. Epidemiological characteristics of ocular trauma in a regional reference ophthalmology institute, Trujillo Peru, 2016 - 2017. *Acta Médica Peru*. 2019;36(4):281–286. doi:10.35663/amp.2019.364.902
22. Kyriakaki EDO, Detorakis ET, Bertsias AK, et al. Clinical and social features of patients with eye injuries admitted to a tertiary hospital: a five-year retrospective study from Crete, Greece. *Healthcare*. 2023;11(6):885. doi:10.3390/healthcare11060885
23. Hoskin AK, Watson SL, Mackey DA, Agrawal R, Keay L. Eye injury registries – a systematic review. *Injury*. 2019;50(11):1839–1846. doi:10.1016/j.injury.2019.07.019
24. Hoskin AK, Mackey DA, Keay L, Agrawal R, Watson S. Eye Injuries across history and the evolution of eye protection. *Acta Ophthalmol*. 2019;97(6):637–643. doi:10.1111/aos.14086
25. Hoskin AK, Philip SS, Yardley AME, Mackey DA. Eye injury prevention for the pediatric population. *Asia Pac J Ophthalmol*. 2016;5(3):202. doi:10.1097/APO.0000000000000193
26. Sengupta P, Mazumdar M, Gyatsho J. Epidemiology of ocular trauma cases presenting to a tertiary care hospital in a rural area in West Bengal, India over a period of 2 years. *IOSR J Dent Med Sci*. 2016;15(3):92–97. doi:10.9790/0853-15329297
27. Kyriakaki ED, Symvoulakis EK, Chlouverakis G, Detorakis ET. Causes, occupational risk and socio-economic determinants of eye injuries: a literature review. *Med Pharm Rep*. 2021;94(2):131–144. doi:10.15386/mpr-1761
28. Semp DA, Beeson D, Sheppard AL, Dutta D, Wolffsohn JS. Artificial tears: a systematic review. *Clin Optom*. 2023;15:9–27. doi:10.2147/OPTO.S350185
29. Bale BI, Elebesunu EE, Manikavasagar P, et al. Antibiotic resistance in ocular bacterial infections: an integrative review of ophthalmic chloramphenicol. *Trop Med Health*. 2023;51(1):15. doi:10.1186/s41182-023-00496-x
30. Dang DH, Riaz KM, Karamichos D. Treatment of non-infectious corneal injury: review of diagnostic agents, therapeutic medications, and future targets. *Drugs*. 2022;82(2):145–167. doi:10.1007/s40265-021-01660-5
31. Gao G, Yu M, Dai J, et al. Demographic and clinical characteristics of a pediatric low vision population in a low vision clinic in China. *Clin Exp Optom*. 2016;99(3):274–279. doi:10.1111/cxo.12294
32. Abrahamson IA. Management of ocular foreign bodies. *Am Fam Physician*. 1976;14(3):81–87.
33. Wang M, Wang H, Xiao G, et al. Severe marginal ulcerative keratitis induced by an insect foreign body in the cornea. *Cornea*. 2020;39(8):1059–1061. doi:10.1097/ICO.0000000000002351
34. Qin B, Chen S. Conjunctival Injury. Yan H editor. *Atlas of Ocular Trauma [Internet]*. Singapore, Springer; 2019 [cited January 9, 2025]: 9–12. Available fromhttps://link.springer.com/chapter/10.1007/978-981-13-1450-6_2.
35. Omolase CO, Omolade EO, Ogunleye OT, Omolase BO, Ihemedu CO, Adeosun OA. Pattern of ocular injuries in Owo, Nigeria. *J Ophthalmic Vis Res*. 2011;6(2):114–118.
36. Mallika P, Tan A, Asok T, Faisal H, Aziz S, Intan G. Pattern of ocular trauma in Kuching, Malaysia. *Malays Fam Physician*. 2008;31(3):140–145.
37. Puodžiuvienė E, Jokūbauskienė G, Vieversytė M, Asselineau K. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. *BMC Ophthalmol*. 2018;18(1):10. doi:10.1186/s12886-018-0676-7
38. Onakpoya OH, Adeoye A, Adeoti CO, Ajite K. Epidemiology of ocular trauma among the elderly in a developing country. *Ophthalmic Epidemiol*. 2010;17(5):315–320. doi:10.3109/09286586.2010.508352
39. Gerstenbluth AT, Rabinowitz MP. *Wills Eye Manual: Office and Emergency Room Diagnosis and Treatment of Eye Disease [Internet]*. 6th. Baltimore, United States of America. Wolters Kluwer Health; 2013[cited January 23, 2025]: 464. Available fromhttps://www.wolterskluwer.com/en/solutions/ovid/manual-de-oftalmologia-del-wills-eye-hospital-diagnstico-y-tratamiento-de-la-enfermedad-en-la-consulta-y-en-urgencias-13349.