

International Journal of Medical Ophthalmology



E-ISSN: 2663-8274
P-ISSN: 2663-8266
www.ophtalmoljournal.com
IJMO 2024; 6(2): 94-100
Received: 02-08-2024
Accepted: 03-09-2024

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Epidemiology and patterns of ocular trauma presented to a tertiary eye care center in Delta region in Egypt

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DOI: <https://doi.org/10.33545/26638266.2024.v6.i2b.208>

Abstract

Purpose: The aim of the study is to document the epidemiology, pattern, presentation, management and outcome of ocular and orbital trauma among cases.

Methods: A prospective epidemiological and clinical study conducted on 1468 eyes of 1462 cases with ocular or adnexal trauma at department of Ophthalmology in Tanta University.

Hospitals as a tertiary eye care unit in Delta region in Egypt in the period from May 2021 to May 2023.

Results: 1468 eyes of 1462 patients were enrolled in this study Out of them (79.56%) patients were male and more than 30% (452 eyes) of injuries was among young children less than 10 years of age. A large number of the cases who suffered from ocular trauma were either students or laborers. Out of 1468 patients, 710 (48.37%) had open globe injuries, whereas 504 (34.33%) had closed globe injuries with 272 cases adnexal injuries and burns. Intraocular foreign bodies were linked to 19.15% of open globe damage. 653 eyes (44.48%) had an injury with sharp object. (14.03%) had roadside accidents (RSA), Assaults were responsible for 14.03% of injuries. Delayed presentation was noticed in 2 patients who presented after more than one year, while 1302 patients (88.69%) presented within 24 hours, out of 1468 patients, 650 cases had injury in the right eye, 812 cases had injury in the left eye while in only 6 cases, there was a bilateral injury, the fellow eye showed previous history of ocular trauma in 1.02% of cases (15 case). The final VA was 6/12 or better in 47.82% (702) of eyes, and less than (3/60) in 14.58% (214) of eyes, among them there were 16 of eyes that had no perception of light either due to evisceration/enucleation or atrophied bulbi after vitreo-retinal surgery in children.

A surgical procedure was necessary for 1,356 eyes, however only 112 eyes needed medical therapy alone.

Conclusion: Ophthalmic trauma is a significant public health issue. The majority of the participants are male and under the age of 20. Open globe damage is more prevalent. Occupational injuries and violence are significant contributors.

Keywords: Ocular trauma, adnexal trauma, open globe injury, closed globe injury

Introduction

Ocular trauma is a major contributor to vision impairment and non-congenital blindness on a global scale ^[1]. So interest in ocular trauma is quickly growing to achieve the best approaches for prevention and treatment ^[2]. Eye trauma constitutes 7% of all bodily injuries and 10-15% of all eye diseases ^[3] although, it may be a preventable public health problem ^[1]. Ocular traumas frequently cause specific morbidities, such as blindness, which severely limits the case's social and occupational capacities ^[3]. The socioeconomic impact of ocular trauma may be overstated; however, those who are affected frequently experience persistent physical problems, lifestyle changes, and a lack of career opportunities ^[4]. Certain precautions can be taken to prevent the morbidity that is directly proportionate to the intensity of trauma, which is influenced by socioeconomic level ^[5].

Subjects and Methods

This is a prospective epidemiological and clinical study that included 1468 eyes of 1462 patients with ocular or orbital trauma who presented to Department of Ophthalmology at Tanta university Hospitals as a tertiary eye care unit in Delta region in Egypt.

The study was in the period from 1stMay 2021 to 1stMay 2023.

Inclusion Criteria

Patients admitted to the ophthalmology department for ophthalmic intervention to ocular or

orbital trauma and Patients admitted to other departments for surgical intervention of concomitant insult other than ocular or orbital injury who need ophthalmic consultation and interventions.

Exclusion Criteria

- Cases where clinical findings appeared to be non-traumatic in nature.
- Those who did not give consent for study.
- Patients who were known cases of anterior segment or posterior segment pathology before ocular trauma occurred.

Firstly, we confirmed that the patient was stable, and any other serious non-ocular injuries have been addressed. Secondly, complete ophthalmological evaluation was done for all patients.

History

Demographic data and details of the injury were obtained. Personal history: name, age, sex, occupation, residency, telephone number, date of admission.

The patient must provide a thorough history of the trauma, including the type of trauma, its causes, the object of the trauma, any injuries to other areas of the body, the location and mechanism of the injury, any involvement of the eyes, and the time that passed among the injury and the patient's presentation. History of explosion, gunshot or striking of metal upon metal that raised suspicion for intraorbital or intraocular foreign body. Present history or Past history of medical condition and history of current medications.

History of any previous trauma, imaging modalities with finding and interventions. The visual outcome following primary repair was reported.

2. Complete ophthalmic examination included

- Visual acuity assessment.
- Refraction: auto refractometer.
- External examination of the adnexa: lids, lashes, lacrimal apparatus, and orbit.
- Examination of ocular motility and alignment.
- Assessment of pupillary function.
- Slit-lamp biomicroscopic examination.
- Assessment of mental and physical status. of the patient.

Imaging either X-ray, CT or MRI to document and rule out any intraorbital or intraocular foreign body was requested. and different types of management were recorded.

Data were tabulated and statistically presented and analyzed using SPSS Version 20.00 program.

Results

Over the 2 years duration of the study, 1468 eyes of 1462 patients (admitted as inpatients) satisfied the inclusion criteria were enrolled in this investigation.

The demographic data

❖ As regards age distribution

The average age of the individuals included in the study was 22.7 ± 17.5 years, and their ages varied from 1 to 80 years.

Table 1: Age distribution of the patients included.

Age distribution			
Age (Years)		Range	1-80
		Mean \pm SD	22.743 \pm 17.507
		N	%
Age groups	1-10 Years	452	30.79
	11-20 Years	361	24.59
	21-30 Years	242	16.49
	31-40 Years	177	12.06
	41-50 Years	102	6.95
	51-60 Years	73	4.97
	61-70 Years	45	3.07
	71-80 Years	16	1.09

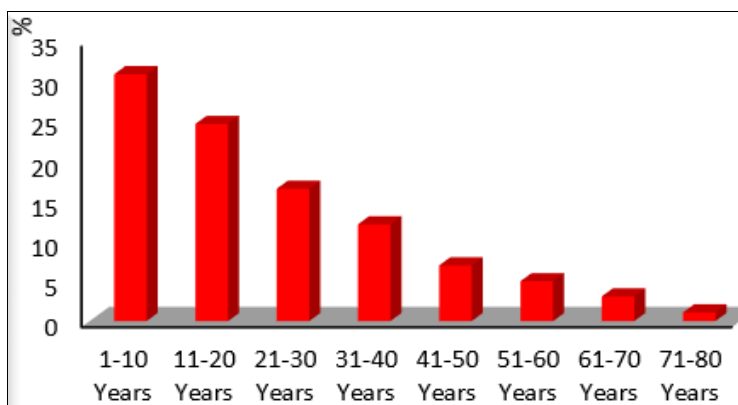


Fig 1: Age distribution of the patients included in the study.

It is obvious that more than 30% (452 eyes) of injuries was among young children less than 10 years who play with hazardous objects such as gunshots, needles, knives, scissors, and pencils left within their reach by parents and supervising adults or among older children who are not instructed about the dangers of these objects.

As regard sex distribution

They were 1168 males (79.56%) and 300 females (20.44%). The majority of patients were males with a male to female ratio of 3.9: 1

Table 2: Sex distribution of the patients.

Sex distribution	N	%
Female	300	20.44
Male	1168	79.56

As regards the occupation of the patients

Among them, 491 were workers (33.45%) and 563 were students (38.35%). Ocular trauma affected a disproportionate number of people in this study; specifically, 33.45% of the workers and 38.35% of the students (Table 3).

On the other hand, students' injuries occurred more often in nearby areas, such as streets or public spaces, rather than at school itself. Housewives and farmers represented 7.02% (103) & 5.79 (85%) respectively, 'No occupation' included those cases in the preschool age or idle individuals represented 15.4%.

As regard various kinds of open globe injuries

Out of 1468 patients, 710 (48.37%) had open globe injuries,

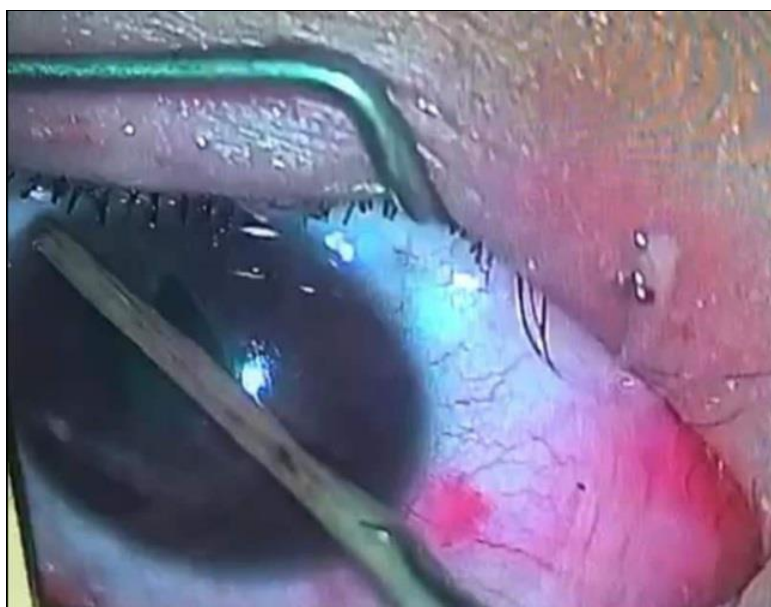
whereas 504 (34.33%) had closed globe injuries. According to BETT classification the number of eyes that accounted for penetrating 557 (78.45%), rupture 10 (1.41%), IOFB 136 (19.15), and perforating injuries 7 (0.99%) were accounted in open globe injury group. One study indicated that the leading cause of open globe damages was penetrating injuries, accounting for 97.6% of all cases. Insect and animal parts, as well as glass, plastic, wood, lead, and metals including iron, copper, nickel, zinc, and mercury are some of the organic materials that can make up IOFBs.

Table 3: The variety of occupations among the patients.

Distribution of occupation		
	N	%
Worker	491	33.45
Student	563	38.35
Housewife	103	7.02
Farmer	85	5.79
Non Occupation	226	15.40
Total	1468	100.00

Table 4: Various kinds of open globe injuries.

Open globe injury		
	N	%
Penetrating Open globe injury	557	78.45
Rupture globe	10	1.41
Perforating Open globe injury	7	0.99
IOFB	136	19.15
Total	710	100

**Fig 1:** A case of corneal wound with FB.**Fig 2:** A case of Globe laceration with projectile object hitting the eye.

As regard various kinds of closed globe damages.

Mixed injuries, contusions, lamellar lacerations, and posterior segment injuries were among the 504 cases of closed globe damages.

146(29.96%) for contusion, 271(53.77%) for lamellar laceration (169 cases for conjunctival wound which sutured intraoperatively, 53 corneal wound, 7 scleral wound, 37 cases of intrastromal corneal F.B, 4 cases lamellar laceration with retrobulbar hematoma, 1 case of lamellar laceration with intrascleral F.B)

5 cases of ocular surface chemical injury, 1 case of mydriasis after sphincter rupture, 2 cases of iridodialysis which underwent iridoplasty, regarding lens injuries there were 2 cases of lens dislocation, traumatic cataract cases due to closed globe injuries weren't included in this study, also 1 case of IOL dislocation and 1 case of IOL

displacement met the criteria and included in this study.

Also, there were 71 cases (14.09% of the total) involving closed globe damages that affected the posterior segment; 31 eyes among them due to retinal detachment, chorioretinitis sclopetaria, choroidal rupture, commotio retinae, another case of closed funnel retinal detachment classified separately due to different circumstances and different management as the patient's mother complained of eye deviation 1.5 years after fall from a bike.

34 cases of severe traumatic vitreous hemorrhage that needed secondary intervention by vitreoretinal surgeon, 5 cases of traumatic optic neuropathy after blunt trauma or car accident one of them after fall from a tree. It was found that conjunctival wounds and contusion injuries were the most prevalent causes of closed globe damages.

Table 5: Various kinds of closed globe injuries.

Closed globe injury			
		N	% of all cases
Contusion	Traumatic Hyphema	143	9.74
	Severe Subconjunctival Hge	3	0.20
	Conjunctival Wound	169	11.51
	Lamellar laceration with Intrascleral Fb	1	0.07
	Intrastromal /deep Corneal Fb	37	2.52
	Lamellar laceration with Retrobulbar Hematoma	4	0.27
	Corneal Wound	53	3.61
	Scleral Wound	7	0.48
	Ocular surface Chemical Injury	5	0.34
Iris injuries	Sphincter Rupture	1	0.07
	Traumatic Iridodialysis	2	0.14
Lens/IOL injuries	Lens Dislocation	2	0.14
	IOL Dislocation	1	0.07
	IOL Displacement	1	0.07
Posterior segment injuries	Choroidal rupture	1	0.07
	Commotio Reinae	1	0.07
	Closed Funnel RD	1	0.07
	Retinal insult	33	2.25
	Vitreous Hemorrhage	34	2.32
	Traumatic Optic Neuropathy	5	0.34

As regard various kinds of ocular adnexal injuries.

Total adnexal injuries was 272 cases, in which 117 cases of the adnexal injury (7.83%) had upper lid injuries, 120 cases (8.17%) had lower lid injuries. As well as 27 cases (1.84%) had injuries in their upper and lower lid simultaneously. Also there were 3 cases of intraorbital FB without affection

of the globe, 2 cases of orbital floor fracture As well as 2 cases of subperiosteal hematoma; one of them developed subperiosteal abscess, a case of severe ecchymosis which was associated with hyphema was encountered while other cases of contusions which weren't sight threatening not included in this study.

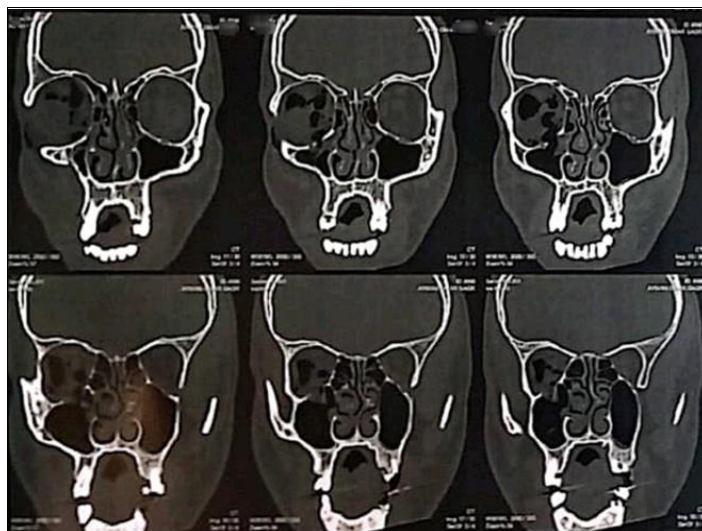


Fig 3: A case of right orbital blow out fracture; fractured inferior orbital margin with herniated infraorbital fat into maxillary sinus causing enophthalmous.

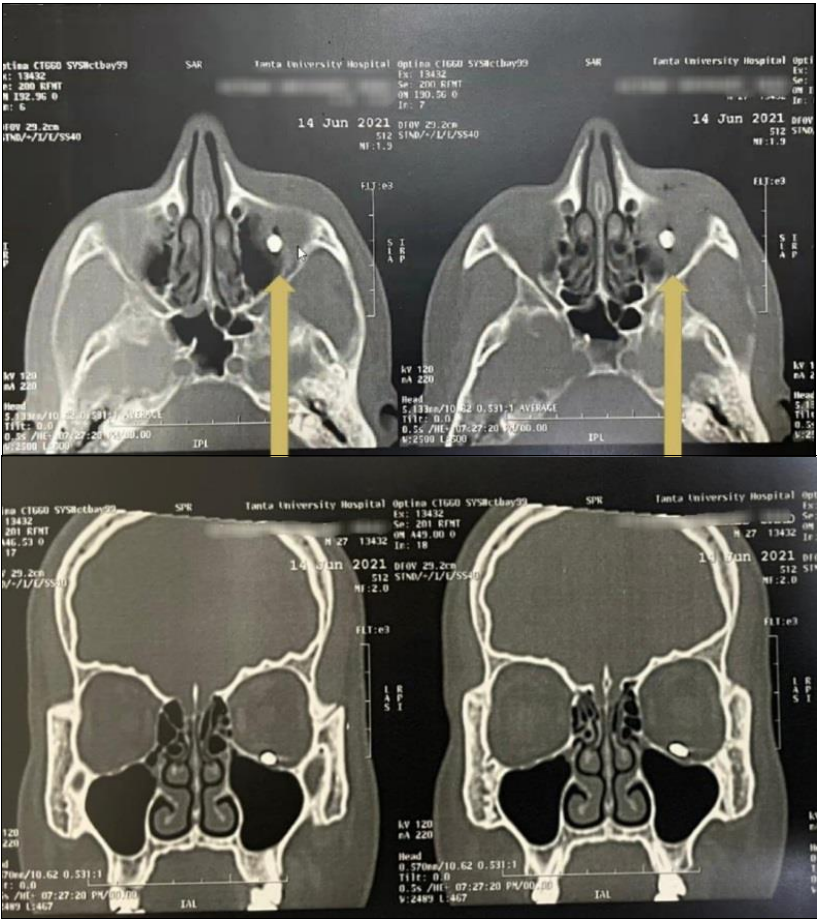


Fig 4: A case of intraorbital F.B after penetrating open globe injury.

As regard laterality of the injured eye

Out of 1468 patients, 650 cases had injury in the right eye, 812 cases had injury in the left eye while in only 6 patients, there were a bilateral injury.

As regard various modes of eye injury

Out of 1468 patients, 206 (14.03%) had road side accidents (RSA) due to high velocity and lack of safety measures. 653(44.48%) had an injury with sharp object (wood, a stick, knife, fishing hook, scissor, broken toy, crow claw, broken sharpener, rod, wire, blade, glass, nail, pillar, pencil) either hit with sharp object or fall on sharp object or sharp object poked in own eye by child. 599(40.80%) had an injury with blunt object (fist, stone, metal, table parts, door knob, shoe, tennis ball, cow horn) and 313 cases projectile fragments from hammering, welding, drilling, grinding or from a machine in a factory; soybean or plastic or metal parts, 6 cases (0.41%) chemical injury, 4 cases of unknown cause while radiation injury not encountered in this study.



Fig 5: A case of partially eviscerated eye after horse kick

As regard Elapsed time from injury to presentation.

Out of 1468 ocular injury, 1302 (88.69%) presented within 24 hours, 153 patients consulted between 1-2 days, 13 patients presented after 48 hours. It was noted that the vast majority of cases presented within the first 24 hours of the damage. while a few of them (0.89%) presented after 48 hours, one of them 4 years old child with total funnel shaped retinal detachment, the patient's mother came for squint surgery with history of trauma over 1.5 years. Other case with siderosis bulbi after sealed corneal wound with metallic intra ocular foreign body discovered during routine examination with lower retinal foreign body (iron).

As regard Place of injury

256 eyes (17.44%) were involved in road side accidents and street violence, 414 eyes (28.20%) were involved in work-related injuries, 457(31.13%) patients were involved in home related injuries and 143 (9.74%) were sports related injuries,while169(11.51%) were injured in public place. So, it was observed that injury during work and home related injuries are the place where the majority of traumas occurred.

Table 6: The intent of eye injury.

Intent		
	N	%
Unknown	5	0.34
Assault	206	14.03
Unintentional	1205	82.08
Self-Inflicted	52	3.54
Total	1468	100.00

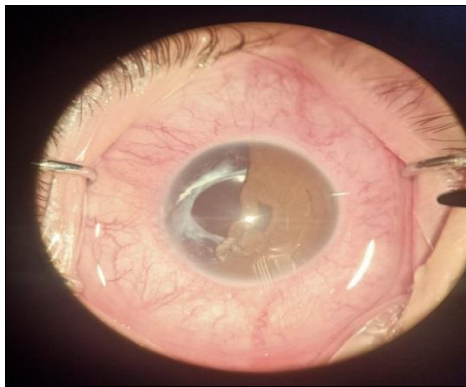


Fig 6: A case of traumatic iridodialysis after cataract surgery (assault by a family member).

As regard the intent of injury

Assaults were responsible for 14.03% of injuries while 82.08% of eye injuries occurred unintentionally, 3.54% were self-inflicted by young children with a sharp instrument as a broken toy or scissor.

As regard the socioeconomic status of patients

Delta region in Egypt contain several large cities as Tanta (the capital of al gharbiya governorate) and also a lot of towns and villages in different governorates.

The major group of patient came from rural areas (91.96%) and only (8.04%) from urban areas, the most of them encountered in road traffic accidents because of high velocity in the newly constructed roads and highways in the area with a little of safety measures, a lot of injured people admit they didn't use helmet for motorbikes or seat-belt for cars.

Table 7: The socioeconomic status of patients.

Socioeconomic status of patients		
	N	%
Urban	118	8.04
Rural	1350	91.96
Total	1468	100.00

As regard the final visual acuity of the cases

The final VA was 6/12 or better in 47.82% (702) of eyes, (6/18-6/60) in 36.24% (532) of eyes, and less than (3/60) in 14.58% (214) of eyes, among them there were 16 of eyes had no perception of light either due to evisceration/enucleation or atrophied bulb after vitreo-retinal surgery in children, the final visual acuity were unknown in 1.36% (20) of eyes.

Table 8: The final visual acuity of the cases.

Final visual acuity		
	N	%
6/12 or better	702	47.82
From 6/18 To 6/60	532	36.24
Less Than Or Equal To 3/60	198	13.49
No Pl	16	1.09
Missing	20	1.36
Total	1468	100.00

The ophthalmic team in charge of admissions included both senior residents and consultant ophthalmologists who all adhere to the same standards. Highly skilled consultant ophthalmologists followed standard operating procedure and anesthesia protocols when performing the surgical procedures. A consulting radiologist completed the imaging procedures and analyzed the results.

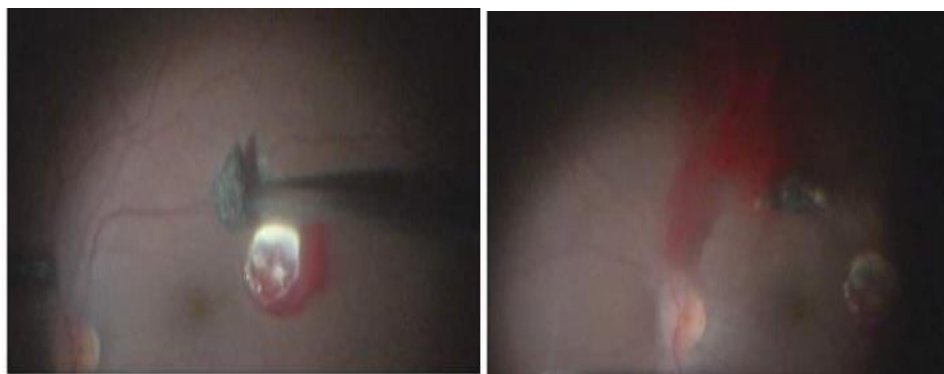


Fig 7: Vitreoretinal surgery for removal of IOFB

Discussion

This is the largest and most recent epidemiological study of ocular trauma in Egypt mainly in delta region, Although our study focused on hospitalized patient with sight threatening injuries, it has reported high rates of eye injury 1468 eye injuries of 1462 patients.

While in a study in Egypt^[6] there were 153 eyes of 147 patients included during the study period (6 months).

In another study that retrospectively incorporated patients hospitalized for ocular trauma in a Mediterranean area, there were 298 eye injuries from 290 patients over 5- year's period^[7]. In our study the age of the studied patients ranged from 1 years to 80 years with the Mean \pm SD was 22.7 ± 17.5 years, that correlated with a study in Egypt conducted by Macky T *et al.*, in which The mean age for ocular trauma was 22 years^[6], and another study in which the mean age of patient with ocular trauma was 25 ± 17 years (range: 1-80 years)^[8].

This study holds importance because it highlights the immediate need of medical and administrative attention for prevention of catastrophic loss of vision as a result of ocular and orbital trauma with the fact that most cases involved young and working groups reflects the socioeconomic burden of ocular injury on our communities.

In this study, workers and students each constituted a large sector of patients with ocular or orbital trauma, being 33.45% and 38.35% respectively of the total cases.

That correlates with the study conducted by Macky T *et al.*, in which workers and students each constituted 35% and 37% respectively^[6], one of the reasons why students supervenes workers in our study that a large portion of injuries were in the younger age groups. On the other side this study doesn't correlated with the study conducted by Elhesy *et al.*, in which students represented 18.5% of hurt individuals^[8].

Housewives, farmers and non-occupational persons

represented 7.02% & 5.79%, 15.4% respectively compared to 7.2%, 2.5%, 34.2% respectively in another study^[8]. The left eye is more prominent may be because most people are right handed so their victims will be injured in their left eye. Similarly a study conducted in Australia reported that left eye injuries encountered more than the right eye^[9]. Conversely, a study conducted in Egypt reported that both eyes were equally affected^[6].

Conclusion

Based on our findings, we can say that open globe injuries are the most common type of ocular trauma, and that young adult males are the most affected.

The majority of patients who experience trauma to the eyes or orbit are polytraumatic, necessitating further medical, surgical, and diagnostic procedures. We must educate the public if we want to stop eye damage. Equally important is the need to improve safe and secure workplaces. Many of the injuries could have been prevented, if the patients had used protective eye measures during work or play. This awareness can be raised by health education in schools and factories.

Conflicts of Interest: Nil

Funding

This work was self-funded by the author's changes

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How to Cite This Article

ElSheikh DA, Awara AM, Shalaby OE, El Desouky A. Epidemiology and patterns of ocular trauma presented to a tertiary eye care center in Delta region in Egypt. *International Journal of Medical Ophthalmology.* 2024; 6(2): 94-100.