

Pattern of Childhood Ophthalmic Injuries in Upper Egypt

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Abstract

Introduction: Ophthalmic injuries in children represent important health concern that may result in lifelong disfigurements and infirmities. **Aim of the work:** to describe the pattern of ophthalmic injuries in children admitted to Assiut University Hospitals. **Subjects and Methods:** This study is a prospective descriptive study included 72 children admitted to causality unit of Assiut University Hospital with ophthalmic injuries in the period from 1st January 2021 to 30th June 2021. Detailed history and ocular examination were performed for the included subjects. The visual status after injury and after initial repair was evaluated. **Results:** Mean age of the patients was 8.23 ± 4.55 years, and the male patients represented more than half of the cases with percentage of 58.34%. Most cases were from rural areas (87.5%). The highest incidence (97.24 %) of the cases was accidental and only 2.78% was homicidal. The commonest type of injury was blunt trauma, accounting for 43.06% of the total and penetrating injuries by sharp and/or pointed instruments represented 37.5% of cases. While Intraocular foreign body represented 16.67% of cases. More than half of cases (52.78%) had closed globe injuries while 47.23% of cases had open globe injuries. The visual status after injury and after initial repair was less than 1/60 in 44.44 % of cases (32 cases). **Conclusion:** Ocular trauma represents a major health concern and cause of decreased visual acuity in children. Domestic eye trauma is mainly accidental and could be avoided and thus education of safety measures is required.

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Key words

Domestic, trauma, ocular, pediatric

Introduction

Ocular trauma is damage to the eye by mechanical, electrical, thermal, or chemical energy (Scott, 2011). It represents a major cause of morbidities and infirmities particularly in pediatric population (McGwin et al., 2005 and Mayeka et al., 2017). In addition to the morbidity, Ocular trauma may have long-term psycho-social consequences for the patient (Bućan et al., 2017).

Eye trauma is a global health issue, especially in developing nations, approximately 1.6 million people are estimated to have vision loss, 2.3 million people have bilateral visual impairment, and 19 million people have unilateral visual impairment owing to ocular trauma worldwide (Kutlutürk Karagöz et al., 2018).

Generally, children are particularly vulnerable to ocular trauma due to undeveloped muscle control, curiosity and poor judgment (Bućan et al., 2017). Aghadoost et al (2012) reported that the majority of ocular injuries occur indoors. Furthermore, In Canada, most of ophthalmic injuries were also reported to occur at homes, then schools and other situations (Podbielski et al., 2009).

Open globe injury refers to a penetrating injury to the eye by foreign object or projectile while closed globe injury occurs in the absence of a full thickness ocular wall laceration or rupture (Shah et al., 2018).

Aim of the Work

The goal of this research was to analyze the epidemiology of domestic ocular traumatic injuries in children who needed to be admitted to Assiut University Hospital's Ophthalmology Department from 1st January 2021 to 30th June 2021.

Subjects and Methods

This is a prospective descriptive study that included all Patients aged less than 18 years with any type of eye injury (mechanical, chemical or physical) from 1st January 2021 to 30th June 2021 in both causality unit of Assiut University and Ophthalmology department. The study involved 72 patients who were hospitalized for a short period of time. For each patient age, gender, residence, causes, nature of trauma, visual acuity, and diagnosis were all recorded. Patients' visual acuity was classified into groups as 6/12 or better, 6/18–6/60, 5/60–1/60. Patients were also categorized according to the documented object causing the injury (Foreign bodies were put into a separate category). Comparison of the type of injury with different age groups and sex was carried out. Comparison of the visual acuity between open and closed globe injury was also noted.

The study was approved by the scientific research Ethics Committee of Faculty of Medicine, Assiut University (Egypt) with Ethical Number "17300676", and the study was conducted in accordance with the ethical standards laid down by the Declaration of Helsinki. Informed consent was obtained from the legal

guardian for each participating subject and confidentiality of data was considered.

Statistical analysis

The data analysis was carried out by the excel program and SPSS version 26. (SPSS program, Chicago, Illinois, USA). The Student t test and the two-sample t test were utilized to compare two groups of (quantitative data and qualitative data) respectively. If the P value was less than or equal to 0.05 at a 95% confidence interval, it was considered significant.

Results

The study included 72 children admitted to causality unit of Assiut University Hospital and Ophthalmology department with ophthalmic injuries. All of the patients arrived at the hospital within 24 hours of their accident without evidence of previous ocular disease or trauma in either the injured or the other eye. Table (1) illustrates the mean age of the injured children presented with ophthalmic injury. The mean age for studied patients was 8.23 ± 4.55 years old, the male patients represented 58.34% in comparison to female patients who were only 41.67%, most cases were from rural areas 87.5% and urban residence represented 12.5%. The wounded children were grouped into three age groups: 0–5 years, (infants, toddlers and preschool), they represented 30.6% of cases. The age from 6 to 10 years represented 44.4% while children older than 10 years represented 25%.

Table (2) demonstrates the manner of ophthalmic injury; it was found that the highest incidence of cases was accidental 97.24 % and only 2.78% were homicidal. The types and causes of injury as shown in table (3) were blunt trauma which was the commonest type, accounting for 43.06% of the total. Regarding the causes of blunt trauma are classified as 5.56% cases by fall from height, 11.12% by fall on stairs, 9.73% by fall on the ground, 5.56% by the animal kick, 1.39% by wall fall, and 1.39% by fist.

Penetrating injuries represented 40.28%; 11.12% during playing with toys, 9.73% during playing in front yard by stone, 8.34% by broken glass & broken sun glasses, 4.17% by kitchen tools (knives & forks), 2.78% by fishing hook & cloth hanger 1.39% by school supplies (ruler), 1.39% by shot gun and 1.39% by firework.

Intraocular foreign bodies represented 16.67% of studied cases; 11.12% cases with intraocular foreign body in the cornea by metal particles (nails, Iron filings

&wires), and 5.56% cases by wooden and plant stick injuries Figure 1, Photos 1, 2, 3 & 4.

Table (4) shows that closed globe injuries were found in 52.78 % of cases, while open globe injuries were found in 47.23 %; hyphema occurred in 16.67% of the closed globe injuries of all cases, 18.06% of cases had vitreous hemorrhage, and retinal detachment was observed in 25% of all cases. Right eye globe rupture was seen in 25% of individuals with open globe injuries, 22.23% with left eye globe rupture, and 47.23% of examined eyes showed low intraocular pressure. Corneal tear occurred in 40.28% of cases, scleral rupture happened in 13.89% of cases, and 29.17% of eye injuries presented with iris prolapse. Subluxation/dislocation of the lens was involved in only 1.39% and ruptured in 2.78%. On pupil examination; 26.39% of injured eyes had distorted pupil and 9.73% of cases were non-reactive. 22.24% of traumatic eyes had eye lid trauma, 26.39% of injured cases had ecchymosis & edema, and 2.78% of cases had blepharitis. Lacrimal gland was affected and lacerated in 8.34% of cases while lacrimitis occurred in 25% of cases. Conjunctiva reacts to injury by inflammation in 26.39% and hemorrhage in 12.5%, 4.17% of cases had orbital roof fissure fracture and only 1.39% of eyes had restricted motility after trauma.

After an injury and first repair, the visual state is examined and divided into three groups: Level I = good visual acuity, 6/36 or above (34.73%); Level II = moderate visual acuity, from 6/60 to 1/60 (20.84%); and Level III = poor visual acuity, 1/60 or less (44.45%) as shown in table (5). The distribution of visual acuity grades among gender is shown in figure (2).

Weak correlation between age, gender and globe rupture was demonstrated in Table (6). While a statistically significant relationship was found between type of globe rupture (open & closed) and visual acuity was demonstrated in Table (7).

Table (8) represents the outcome of the injured cases (complications and permanent infirmity), 25% of injured cases developed posttraumatic cataract, 12.5% of cases had posttraumatic endophthalmitis, and 4.17% had posttraumatic exophthalmos. The percentage of the cases who had 50% permanent infirmity were 38.89 , while 15.28% of children need full assessment after complete recovery to assess percentage of permanent infirmity and only 1.39% developed eye lid deformity.

Table (1): Independent sample T test of demographic data distribution in injured eyes among 72 studied children.

Parameter	Percentage	Age (Mean \pm SD)	T	P-value
0-5 years	30.6%	8.23 \pm 4.55 years		
> 5-10 years	44.4%			
> 10 years	25%			
Sex:				
- Male	58.34%	9.6 \pm 4.68 years	-2.007	0.002**
- Female	41.67%	6.18 \pm 3.52 years		
Residence:				
- Urban	12.5%	5.44 \pm 1.59 years	3.287	0.049
- Rural	87.5%	8.65 \pm 4.70 year		

**P < 0.05 is considered significant.

Table (2): The distribution of manner of ocular injury among the 72 studied children.

Manner of injury	Percentage
Accidental	97.24%
Homicidal	2.78%

Table (3): The distribution of causes of ocular trauma among the 72 studied children.

Causes of ocular injury		Percentage
Blunt trauma	Fall from height (8 cases)	43.06%
	Fall on stairs (8 cases)	
	Fall on ground (7 cases)	
	Animal Kick (4 cases)	
	Hit by Fist (1 case)	
	Hit to wall (1 case)	
Penetrating trauma	Toys (8 cases)	40.28%
	Stones (7cases)	
	Broken glasses (6 cases)	
	Kitchen tools (3 cases)	
	Fishing hook (1case)	
	Cloth hanger (1case)	
	Ruler (1case)	
	Shotgun (1case)	
IOFB	Firework (1case)	16.67%
	Metal particles (8 cases)	
	Wooden and plant sticks (4 cases)	

IOFB: Intraocular foreign body

Table (4): The distribution of different ocular injuries among the studied cases.

Type of Injury	Percentage of cases (%)	
Eye globe Rupture	48.61%	
Corneal tear	40.28%	
Prolapsed iris	29.17%	
Retinal Detachment	25%	
Vitreous hemorrhage	18.06%	
Eye lids	Wound	22.24%
	Oedema and ecchymosis	26.39%
	Blepharitis	2.78%
Hyphemia	16.67%	
Pupil	Distorted	26.39%
	Non-reactive	9.73%
Low intra ocular pressure	47.23%	
Lens	Dislocated lens	1.39%
	Ruptured	2.78%
Conjunctiva	Conjunctivitis	26.39%
	Hemorrhage	12.5%
	Conjunctival chemosis	4.17%
Lacrimal gland	Lacerated	8.34%
	Dacryocystitis	25%
Scleral rupture	13.89%	
Restricted ocular motility	1.39%	

Table (5): Chi-square statistical analysis of visual acuity after injury and after initial repair among both sexes of the included 72 children.

Visual acuity	Percentage	No of cases per gender	Chi-square	
			X ²	P- value
Poor VA	41.67%	21 Males	5.54	0.062
		11 Females		
moderate VA	20.84%	11 Males		
		4 Females		
Good VA	34.73%	10 Males		
		15 Females		

P < 0.05 is considered significant VA: visual acuity X²: Chi-square statistical analysis

Table (6): Pearson coefficient correlations between globe rupture (n 35), age, and sex

Parameter		R	P-value
Sex	21 Males	-0.033	.784
	14 Females		
Age		.178	.139

P < 0.05 is considered significant, Pearson's R varies between +1 and -1(+1 is a perfect positive correlation, -1 is a perfect negative correlation. 0 means there is no linear correlation at all).

Table (7): Chi-square statistical analysis of visual acuity in both type of globe injury among the 72 studied cases

	Good VA 32	Moderate VA 15	Poor VA N 25	Chi-square	
				X ²	P- Value
Closed globe 37	5 (13.51%)	14 (37.84%)	18 (48.65%)	31.45	0.000***
Open globe 35	27 (77.14%)	1 (2.86%)	7 (20%)		

P < 0.05 is considered significant.

Table (8): The distribution of predicted permanent infirmity and deformity among the studied cases.

Permanent infirmity and deformity	Percentage
50% (unilateral blindness)	38.89%
Can't be assessed	15.28%
eye lid Deformity	1.39%
Posttraumatic complications	
Cataract	25%
Endophthalmitis	12.5%
Exophthalmos	4.17%

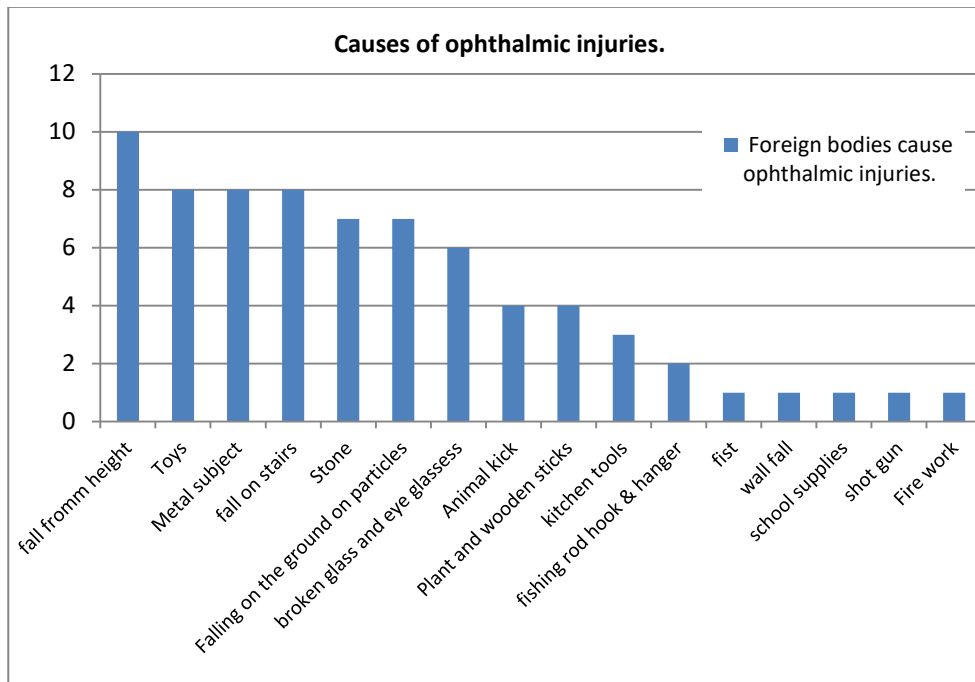


Figure (1): Distribution of different causes of ocular trauma

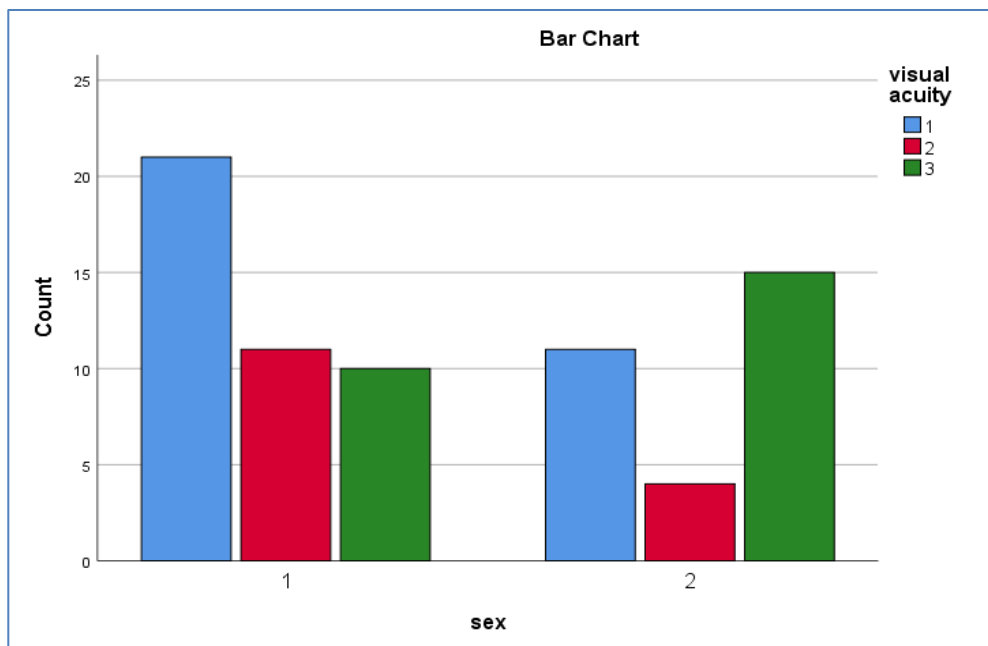


Figure (2): Bar chart showing distribution of visual acuity grades among gender

Level 1 = good visual acuity.
 Level 2 = moderate visual acuity.
 Level 3 = poor visual acuity



Photo 1: A male child with intracorneal foreign body due to trauma with wooden substance.



Photo 2: A baby boy with left eye globe rupture due to hitting himself by an irregular hard toy.



Photo 3: A male child with lacerated upper lid wound due to animal kick



Photo 4: A male child with severe sub conjunctival hemorrhage due to fall from height.

Discussion

Ocular trauma is a worldwide health problem in pediatric population. The current study included 72 children admitted to causality unit of Assiut University Hospital with domestic ophthalmic trauma from 1st January 2021 to 31st June 2021. Mean age of the patients was 8.23 ± 4.55 years, Because of their natural curiosity, weak motor skills, poor decision making, and

lack of fear of risk, ocular accidents are more common in young children (Bućan et al., 2017).

Children's ocular damage is mostly unintentional and follows an age-related pattern; accidents are common among children and are among the top five causes of death in developed and developing countries (Ahmed et al., 2020). The present results showed that

the highest incidence (97.24 %) of the cases was accidental and only 2.78% were homicidal. This is supported by previous literature stating that most eye injuries are unintentional (Podbielski et al., 2009 and Bućan et al., 2017).

The male patients in the current results represented more than half of the cases with percentage of 58.34 in comparison to female patients who were only 41.67%. A study in Croatia that involved 353 children with eye injuries during 16-year study period, yielded a male-to-female distribution of 5:1 (Bućan et al., 2017). A study in Belgrade also reported male to female ratio of 3.6:1 where male children represented 78.3% (Jovanović et al., 2013). Males are more prone to injuries, as in most societies as male children are granted more liberty than females and they are encouraged to exhibit more competitive and aggressive behavior as a part of their normal characteristics (Vlassoff, 2007).

Our results demonstrated that most cases were from rural areas (87.5%). More hazardous practices were reported to be common in rural areas and agricultural communities from other areas of the World. Furthermore, lack of adequate parental supervision might have been an additional factor in causing ocular trauma (Bayoumi et al., 2020).

The eyes are among the most frequently involved anatomical region exposed to blunt (non-penetrating) trauma (Kumar et al., 2018). The commonest type of injury in the present study was blunt trauma, accounting for 43.06% of the total injuries. Blunt ocular trauma can manifest in many ways in both the anterior and posterior segments depending on the nature and severity of the trauma (Stone and Klemencic, 2010). Ocular penetrating traumas were reported to be most frequently seen in children and adolescent patients (Keklikci et al., 2008). In general, penetrating eye injuries have a worse prognosis, are more likely to necessitate surgery, and result in long-term vision impairment. (Bućan et al., 2017). Penetrating injuries by sharp and/or pointed instruments represented 40.28% of cases in the present study while intraocular foreign body represented 16.67% of the studied cases. It was reported previously that intraocular foreign body is an occupational injury in most cases (El-Mekawey et al., 2011).

All ocular structures are vulnerable to injury, but the site often depends on the causes of ocular injury, the injuries of studied cases included corneal tear (40.28%), iris prolapse (29.17%), retinal detachment (25%), distorted pupil (26.39%), vitreous hemorrhage (18.06%), hyphemia (16.67% of cases), scleral rupture (13.89%), and conjunctiva hemorrhage (12.5%) The affection of these structures may lead to disfigurement, poor vision or blindness leading to major lifestyle changes (Elsayed et al., 2019).

Our results demonstrated that more than half of cases (52.78%) had closed globe injuries while 47.23% of cases had open globe injuries. This agrees with an Indian study which reported that closed globe injury was the commonest (62.19%) (Chakraborti et al., 2014).

An open globe injury (an injury penetrating into the globe) involves a full thickness wound of the corneoscleral wall which may result from penetrating

or blunt eye trauma (Sukati, 2012). Open globe injury threatens vision and may result in blindness (Schmidt et al., 2008). Kutlutürk Karagöz et al. (2018) reported that open globe injury is more prevalent among males than among females. However our results did not show any significant difference between males and females.

The visual status following injury and early restoration is tested and classified into three groups: Level I = good visual acuity, 6/36 or better; Level II = moderate visual acuity, 6/60 to 1/60; and Level III = poor visual acuity, 1/60 or less in the current study. Results: The visual status after injury and after initial repair was less than 1/60 in 44.44 % of cases. This is supported by results of Mayeka et al. (2017) who reported that 44% of children admitted to Mulago Hospital Eye Department (Uganda) with eye trauma were reported to have poor vision in the affected eye.

The present analysis demonstrated strong correlation between open globe injury and poor visual acuity. Reduced visual acuity was more likely in open globe injuries. In the group of cases who had closed globe trauma, 48.64 % had good ultimate visual acuity, while in the open globe trauma group; % had good final visual acuity. Poor vision acuity was identified in 13.51 % of closed globe trauma patients and 77.14 % of open globe trauma patients.

Conclusion and Recommendations

The majority of ocular trauma in children occurs in the home. Injuries range from eyelids edema to globe rupture. The majority of eye injuries in children can be avoided. It emphasizes the need of providing a secure environment for children, as well as health education, adult supervision, and the implementation of appropriate trauma prevention strategies.

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نمط إصابات عيون الأطفال في صعيد مصر

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الملخص العربي

مقدمة: تمثل إصابات العيون لدى الأطفال مصدر قلق صحي مهم قد يؤدي إلى تشوهات وعاهات تدوم مدى الحياة.

هدف العمل: وصف نمط إصابات العيون لدى الأطفال في مستشفيات جامعة أسيوط.

طرق البحث: هذه الدراسة عبارة عن دراسة وصفية مستقبلية شملت ٧٢ طفلاً وحدة الاصابات بمستشفى جامعة أسيوط من إصابات في العيون في الفترة من ١

يناير ٢٠٢١ إلى ٣١ يونيو ٢٠٢١. تم إجراء فحص التاريخ السريري والفحص البصري. تم تقييم الحالة البصرية بعد الإصابة وبعد الإصلاح الأولي.

النتائج: متوسط عمر المرضى كان ٨,٢٣ ± ٤,٥٥ سنة ، ويمثل المرضى الذكور أكثر من نصف الحالات بنسبة ٥٨,٣٤٪. وكانت معظم الحالات من مناطق

ريفية (٨٧,٥٪). أعلى نسبة (٩٧,٢٤٪) من الحالات كانت عرضية و ٢,٧٨٪ فقط كانت متعمدة. أكثر أنواع الإصابات شيوعاً هو الاصابات بالالات رضية

، حيث تمثل ٤٣,٠٦٪ من إجمالي الإصابات المخترقة بواسطة أدوات حادة و / أو مدببة تمثل ٣٧,٥٪ من الحالات. بينما مثلت الأجسام الغريبة داخل العين

١٦,٦٧٪ من الحالات. أكثر من نصف الحالات (٥٢,٧٨٪) كانت إصابات مقلة العين و هي مغلقة بينما ٤٧,٢٣٪ من الحالات كانت إصابات مفتوحة لمقلة

العين. كانت الحالة البصرية بعد الإصابة وبعد الإصلاح الأولي أقل من ٦٠/١ في ٤٤.٤٤٪ من الحالات (٣٢ حالة).

الخلاصة: تمثل صدمة العين مصدر قلق صحي كبير وسببًا لانخفاض حدة البصر عند الأطفال. صدمة العين المنزلية هي في الأساس عرضية ويمكن تجنبها، وبالتالي يلزم توعية تدابير السلامة.

١. قسم الطب الشرعي والسموم الاكلينيكيه - كلية الطب - جامعة اسيوط

٢. قسم طب و جراحة العيون - كلية الطب - جامعة اسيوط