

## **Pediatric Penetrating Eye Injuries at Assiut University Hospital, Assiut, Egypt**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Introduction:** Ocular trauma can be a devastating injury, causing disability for a lifetime in children. Ocular trauma is an important cause of morbidity and can cause unilateral blindness in children. Pediatric eye injuries account for approximately 8-14% of total injuries in children.

**Aim:** This prospective study aims to identify pattern, severity, causes, management, and outcome of penetrating eye traumas among study cases.

**Subjects and Methods:** The current study is an observational, analytic, follow-up, hospital-based study included 64 children aged less than 18 years who presented with penetrating eye injuries seeking health care at Ophthalmology Department, Assiut University Hospitals. The study conducted during a period extended from beginning of July 2016 to end of June 2017.

The study concluded that male subjects comprised 70.3%, of study cases, compared with 29.7% for female ones, rural patients comprised vast majority of cases (85.9%), hitting eye with an object was the most common cause of eye injuries among study children, (62.5%), home accidents comprised more than one-half of total study cases (52.1%), 81.3% of cases sought care within 24 hours since occurrence of accidents. Regarding the pattern of eye trauma contracted by the study cases, results documented that perforating injuries comprised 46.9%, then penetrating injuries 31.3%, then ruptured globe comprised 12.5%, and lastly intra ocular foreign body (IOFB)

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comprised 9.4% of total cases. Concerning the outcome of the study cases, which measured by VA, it is concluded that 49.0% vs 51.0% improved and not improved respectively.

**Study Limitations:**

- Only 51 cases out of the total 64 study cases were subjected to visual acuity (VA) measurement as an indicator for vision improvement of the traumatized cases recruited in the current study. The other 13 cases which had no VA measurement, were too young ( $\leq 3$  years), or uncooperative, so, they gave unreliable responses, hence, they were excluded from this assessment.
- Some cases didn't follow the researcher's instructions regarding the optimal number of follow-up visits.

**Statistical Analysis:** The collected data had been revised and coded before data entry. Then the revised data was saved in the computer via using both EXCEL-2016 & SPSS "Version 19" programs. Then, data cleaning occurred, then the data was subjected to data analysis which included descriptive analysis in the form of frequencies, percentages, means, and standard deviations (SD), as well as cross-tabulation between independent and dependent variables. Chi-square test and Fisher Exact test were used to compare qualitative variables. Paired samples t-test was used to compare quantitative variables between pre-test and post-test. A P-value of less than 0.05 was considered statistically significant. The study results were illustrated in tables and figures as shown in the results section.

*Keywords: Ocular trauma; devastating injury; disability; visual outcome.*

## 1. INTRODUCTION

Ocular trauma can be a devastating injury, causing disability for a lifetime in children [1]. Ocular trauma is an important cause of morbidity and can cause unilateral blindness in children [1,2]. Pediatric eye injuries account for approximately 8-14% of total injuries in children [3]. Eye injuries in children have different patterns than adults and hence require different management protocols. Children below 3 years old mostly suffer from handler-related injuries such as fingernails of parents, care givers, or siblings [4]. Older children have injuries due to sharp objects, toys, tree branches, pencils, and stones [3]. Most common emergencies are due to open-globe injuries and require immediate interventions [5,6]. High community awareness regarding eye injuries and its proper early treatment can give good visual prognosis [7]. Delayed presentation results in substantial damage to the ocular structures and poor visual outcome in these children. Ocular trauma is an important public health problem which is preventable and its etiology, severity, and outcome depends on many factors in the changing environment [8,9]. Ocular injuries are classified into 2 types, as open and closed globe injuries. Open globe injuries lead to full-thickness laceration of the cornea and/or sclera. Open globe injuries can be penetrating (with one entry wound and no exit wound), or perforating (with both entrance and exit wounds) [10]. Closed globe injuries resulting from blunt trauma can

cause hyphema, vitreous hemorrhage, retinal tears and detachment, choroidal rupture, macular edema, and even globe rupture, retrobulbar hemorrhage and traumatic optic neuropathy [11].

### 1.1 Aim of the Study

The study aimed to identify pattern, severity, causes, management, and outcome of penetrating eye traumas among study cases.

## 2. PATIENTS AND METHODS

### 2.1 Study Site

The present study was conducted at Ophthalmology Department, Assiut University Hospital, Assiut Governorate, Egypt.

### 2.2 Study Time

Data collection of the present study extended from beginning of July 2016 to end of June 2017. This means that data collection spanned for almost one year.

### 2.3 Study Design

The present study is an observational, analytic, follow-up, hospital-based study.

### 2.4 Study Subjects

The present study aimed to investigate the penetrating ocular traumas among children aged

less than 18 years who presented at Ophthalmology Department of Assiut University Hospital during study period.

## 2.5 Study Sample Size

A non-probability sample composed of 64 children (45 boys and 19 girls) who presented with penetrating ocular injuries were recruited to comprise the subjects of the present study.

## 2.6 Data Collection Tools

A properly designed questionnaire had been used to collect the relevant data from the study subjects. The questionnaire included questions about the independent variables (risk factors of ocular injuries, such as socioeconomic and environmental background of the study subjects), as well as questions about dependent variables (ocular injuries, management, consequences, and outcomes).

## 2.7 Data Collection Technique

The relevant data was collected through personal interviews with the injured children themselves or with their caregivers (in case of young children or serious cases).

All patients had been subjected to the following investigations & examinations which included:

- Uncorrected VA.
- Complete ophthalmic examination of anterior and posterior segment.
- Skull X-ray if suspect foreign body (FB).
- Ultra-Sonography (USG).
- Computerized Tomography (CT).

This work was carried out in collaboration among all authors. "Kamel Abdel-Naser Soliman" contributed in the study design, and question-aire construction. "Abdel-Salam Abdalla Mohamed" contributed in the study design, writing the protocol. "Mohamed Anwar Sayed" contributed in statistical analysis, writing the protocol, and "Norhan Mohammad Hassan Qayed" contributed in writing protocol, writing the first draft of the manuscript, managing the analyses of the study, and management of the literature searches. All authors read and approved the final manuscript.

## 2.8 Statistical Management

The collected data was revised and coded before data entry. Then the revised data was saved in the computer via using both (EXCEL-2016 &

PSS "Version 19") programs. The saved data was analyzed and presented in the form of frequencies, percentages, means, and standard deviations (SD), as well as, in the form of cross-tabulation between independent and dependent variables. Chi-square test and Fisher Exact test were used to compare qualitative variables. Paired samples t-test was used to compare quantitative variables between pre-test and post-test. A P-value of less than 0.05 was considered statistically significant.

## 3. RESULTS

Concerning the age distribution of the study participants, Table 1 shows that children whose age < 5 years comprised more than one-third (39.1%), children whose age 5-< 10 years comprised 28.1%, and children whose age 10-16 years comprised 32.8% with mean age  $\pm$  SD  $7.42 \pm 4.50$  years.

Regarding the sex distribution of the study participants, Table 1 shows that male cases comprised 70.3%, versus 29.7% for female participants.

Pertaining the residence of the study participants, Table 1 shows that vast majority of traumatized children (85.9%) live in rural areas vs 14.1% who live in urban areas.

Regarding the governorate where the study participants live, Table 1 shows that about two-thirds of traumatized children (62.5%) were inhabitants of Assiut Governorate.

Concerning the educational level of the study participants, Table 1 showed that 42.2% of the study participants were under age, primary school pupils comprised 25.0%, perp. school pupils comprised 20.3%, secondary school students comprised 9.4%, and illiterate children comprised 3.1%.



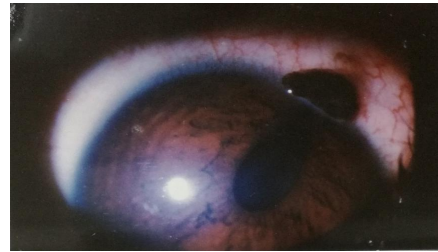
**Fig. 1. Sub conjunctival hemorrhage as an example of closed globe injury in a child**

Pertaining the etiology of eye trauma contracted by the study cases presented at Ophthalmology Department, Assiut University Hospitals, Table 2 illustrates that hitting the eye with an object from any source comprised 62.5%, while hitting the eye by an object during playing comprised 31.3%. Falling on the ground and motor car accidents as an etiology of eye injury comprised 3.1% for each.

Concerning the place where the study cases were exposed to eye trauma, Table 3 revealed that more than one-half of incidents (53.1%) were home accidents, on the other hand, street accidents represented 39.1% and workplace accidents represented 7.8%.

Regarding the time elapsed since occurrence of eye trauma and seeking care at Ophthalmology Department of Assiut University Hospitals, Table 4 illustrates that vast majority of cases (81.3%) presented to Ophthalmology Department, Assiut University Hospitals seeking medical care after less than 24 hours since occurrence of eye trauma, whereas 18.8% of cases presented

after 24 hours or more from occurrence of eye trauma.



**Fig. 2. Iris prolapse through limbal wound with lens matter in AC as example of open globe injury**

Pertaining to pattern of eye trauma experienced by the study cases presented at Ophthalmology Department, Assiut University Hospitals, Table 5 shows that perforating injuries had the highest rank (46.9%), followed by penetrating injuries (31.3%), then ruptured globe injuries (12.5%), and lastly, intraocular foreign body (IOFB) comprised 9.4%.

**Table 1. Personal data of study cases presented at ophthalmology department, assiut university hospital, 2017**

Variables	No. (n= 64)	%
<b>Age: (years)</b>		
< 5	25	39.1
5 - < 10	18	28.1
10-16	21	32.8
Mean ± SD	7.42 ± 4.50	
Median (Range)	7.0 (2.0 – 16.0)	
<b>Sex</b>		
Male	45	70.3
Female	19	29.7
<b>Residence</b>		
Rural	55	85.9
Urban	9	14.1
<b>Governorate</b>		
Assiut	40	62.5
Sohag	8	12.5
Luxor	2	3.1
El-Minia	12	18.8
Aswan	2	3.1
<b>Educational level</b>		
Under age (< 6 years)	27	42.2
Illiterate	2	3.1
Primary	16	25.0
Preparatory	13	20.3
Secondary	6	9.4

**Table 2. Etiology of eye trauma contracted by the study cases presented at ophthalmology department, assiut university hospital, 2017**

Etiology of eye trauma	No. (n= 64)	%
Falling on ground	2	3.1
Hitting with an object	40	62.5
Playing with an object	20	31.3
Motor car accident	2	3.1

**Table 3. Place of incident where eye trauma was contracted by the study cases presented at ophthalmology department, Assiut University hospital, 2017**

Place of incident	No. (n= 64)	%
Home	34	53.1
Street	25	39.1
Workplace	5	7.8

**Table 4. Time elapsed since trauma occurrence and presentation at ophthalmology department, Assiut University Hospital, 2017**

Time elapsed since trauma	No. (64)	%
< 24 hours	52	81.3
≥ 24 hours	12	18.8

Concerning the final diagnosis of the study cases, Table 6 shows that corneal wound had the highest rank among all presented cases (71.9%), followed by hyphema (29.7%), corneoscleral wound and traumatic cataract (12.5%) for each, hypopyon & retinal detachment (9.4%) for each, and lastly scleral wound (6.3%).

Regarding the surgical treatment offered to the study cases presented at Ophthalmology Department, Assiut University Hospitals, Table 7 illustrates that vast majority of cases (81.3%) subjected to repair of corneal wound, irrigation/ aspiration of hyphema represented 26.6%,

followed by irrigation/ aspiration or rupture cataractous lens which represented 21.9%, then repair of scleral wound represented 15.6%, vitrectomy (anterior or core) represented 10.9%, and lastly other surgical procedures such as irrigation/ aspiration of pupillary membranes, reposition of prolapsed iris and intravitreal injection of steroids or antibiotics represented 6.3%.

First of all, visual acuity (VA) measurement have been used as an indicator for vision improvement of the traumatized cases recruited in the current study. In fact, only 51cases out of the total 64 study cases were subjected to VA measurement. The other 13 cases VA measurement were too young ( $\leq 3$  years), so they can't give reliable responses, hence, they were excluded from this assessment.

**Table 5. Pattern of eye trauma contracted by the study cases presented at ophthalmology department, Assiut University Hospital, 2017**

Type of globe injury	No. (n= 64)	%
Perforating injury	30	46.9
Penetrating injury	20	31.3
Ruptured globe	8	12.5
Intraocular foreign body (IOFB)	6	9.4

**Table 6. Final diagnosis of eye trauma among study cases presented at ophthalmology department, Assiut University Hospital, 2017**

Final diagnosis*	No. (n= 64)	%
Corneal wound	46	71.9
Hyphema	19	29.7
Corneoscleral wound	8	12.5
Traumatic cataract	8	12.5
Hypopyon	6	9.4
Retinal detachment	6	9.4
Scleral wound	4	6.3

\* 75.0% of study cases presented with multiple eye injuries

**Table 7. Surgical treatment offered to the study cases presented at ophthalmology department, Assiut University hospital, 2017**

Type of surgery	No. (n= 64)	%
Repair of corneal wound	52	81.3
Irrigation/ aspiration of hyphema	17	26.6
Irrigation/ aspiration or rupture cataractous lens	14	21.9
Repair of scleral wound	10	15.6
Vitrectomy (anterior or core)	7	10.9
Others <sup>‡</sup>	4	6.3

<sup>‡</sup> Others included; 1. Irrigation/ aspiration of pupillary membranes; 2. Reposition of prolapsed iris, 3. Intravitreal injection of steroids or antibiotics

**Table 8. Outcome of eye trauma among study cases presented at ophthalmology department, Assiut University Hospital, 2017**

Outcome	No. (n= 51)	%
Improved	25	49.0
Not improved	26	51.0

#### 4. DISCUSSION

Children are more susceptible to eye injuries because they have immature motor skills and limited common sense. They have a natural curiosity and are often seen imitating without regard to the risks and outcomes. Although most eye injuries are avoidable by simple preventive measures, many children suffer visual impairment that can affect their psychosocial development [4].

**The discussion will cover the following headings:**

**Age:** Concerning the age of the study cases, findings of the current study documented that under 5 years old cases comprised 39.1%, those who aged 5-<10 years comprised 28.1% of the total cases, while those aged  $\geq 10$  years comprised 32.8%, with mean age  $\pm$  SD (7.42  $\pm$  4.50 years). These findings nearly agree with the results of Assiut study, where, El-Sebaity, et al. reported 7.37 $\pm$ 3.42 years as a mean age  $\pm$  SD [5].

Also, the findings of the current study coincident with the findings of a Colombian study conducted by Juan C. Serrano, Patricia Chalela, Juan D. Arias, which reported a mean age  $\pm$  SD of cases as 7.78 $\pm$ 4.25 years [6].

The Philippine study conducted by Theresa and Marissa reported a mean age of the study cases as 8.5 years [4].

Kasr EL- Ani study conducted by Al-Wadeai, et al. revealed that average age of the study cases was 5 years [7]. Tanta study conducted by Elseht and Seleem reported that average age of traumatized children was 9.45 years [8]. The variations between the average age of cases of the current study and the other similar studies may be due to variations in study designs and methodology.

**Gender:** Pertaining to the gender of the study cases, the current study illustrated 70.3% of the

study cases were males. Al-Wadeai, et al. in Kasr EL-Aini study reported that 64.0% of their study cases were males [7]. Colombian study conducted by Juan C. Serrano, Patricia Chalela, Juan D. Arias, which reported that 64.9% of pediatric cases were males [6].

Tanta study concluded that 71.0% of study cases were boys [8]. El-Sebaity, et al. documented that 70.7% of study cases were males [5]. Theresa, Merca, and Marissa reported that 76.6% of study cases were males [4].

Franzco, et al. reported that 78.0% of eye injuries occurred in boys [9]. Minderhoud, et al. concluded that male children with ocular trauma comprised 67.5% [10].

Shazia Qayum, Rafiq Anjum and Punita Garg concluded that male pediatric patients with ocular trauma constituted 77.9% [11]. Maw, et al. reported that 79.0% of their study cases were males [12].

I think, the high figures of eye trauma among boys in many cultures could be accepted, where conservative communities do not put restrictions and tough disciplines on movements and recreations of boys as that put on girls. So, boys feel free to play with their peers and friends with minimal or no supervision of their families. Such circumstances make boys more liable to exposure to accidents and traumas than girls and hence they will be more accident-prone than girls.

**Etiology of eye trauma:** Regarding the etiology of eye trauma contracted by the study cases, the results of the present study revealed that hitting the eye with an object (either hitting from other sources (62.5%), or due to plying with an object (31.3%), compared with 68.6% in El-Sebaity, et al. study [5], and 32.2% in Janna Minderhoud, et al. study in Suriname. [10], Serrano, et al. in Colombian study reported 35.1% for hitting with blunt object [6].

Australian study reported that pediatric eye injury due to hitting with blunt objects constituted 38.8% as causes of eye trauma [9].

Results of the present study illustrated that motor car accidents as a cause of ocular trauma comprised 3.1% of total causes, compared with 7.8% in an Indian study conducted by Rohit Saxena, et al. [13], 2.0% in Colombian study [6]

and 1.0% in Lithuanian study conducted by Puodžiuvienė, et al. [14].

The current study reported that fall on the ground as a cause of ocular trauma represented 3.1%, compared with 20.0% in El-Sebaity, et al. study [5], 8.0% in Australian study conducted by Franzco, et al. [9], 10.47% in Philippine study conducted by Theresa Gladiola B. Merca, and Marissa Valbuena [4], Colombian study reported 2.0 % for falls [6]. The variation in figures may be due to variation of methodology, time, culture, etc.

**Place of occurrence of eye trauma:** Regarding the place where ocular trauma occurred, the results of the present study revealed that home eye accidents represented 53.1%, street accidents represented 39.1% & workplace accidents represented 7.8%. EL- Sebaity, et al. study reported that home eye injuries represented 32.7% [5]. Al-Wadeai, et al. study at Kasr El-Aini concluded that 45.33% of eye injuries occurred at home [7]. The Colombian study documented that 44.4% of eye injuries occurred at home [6]. Suriname study recorded 18.2% for home pediatric eye trauma [10]. The Indian study conducted by Rohit Saxena, et al. concluded that home eye accidents represent 23.5% [13]. Puodžiuvienė, et al. in Lithuanian study concluded that home eye traumas represented 43.3% of all pediatric eye injuries [14].

Australian study conducted by Subhashini Kadappu Franzco, Sue Silveira and Frank Martin Franzco reported that home was the most common place of eye injury occurrence (48.0%) [9]. Nepal study conducted by Dulal, Ale, Sapkota, concluded that 36.8% of pediatric ocular trauma occurred at home [15]. Philippine study reported that 72.09% of pediatric ocular trauma occurred at home [4], Australian study reported that 48% of pediatric eye injuries occurred at home [9].

Maw, et al. reported that 62.0% of injuries occurred outside the home or in the yard, and 38% occurred inside the home [12].

**Time of presentation after trauma:** Regarding the time elapsed since occurrence of eye trauma and seeking care at Ophthalmology Department of Assiut University Hospitals, findings of the current study revealed that more than three-quarters of cases (81.3%) presented to hospital before 24 hours since occurrence of eye trauma,

18.8% presented after  $\geq 24$  hours. Other similar studies, for example, Kirti Singh, et al. reported that 29.0% of cases presented before 6 hours passed since occurrence of eye trauma, 38.0% presented after 6-48 hours, 15.0% presented after 2-<7 days, 6.0% presented after 7- 14 days, and 15.0% presented after > 14 days [16].

Abd-El-Monem in Mansoura study, reported that 69.5% of study cases presented before 24 hours, 23.6% presented after 24 h-1 week, 6.9% presented after more than 1 week [17].

Aghadoost, et al. reported that 68.7% presented after  $\leq 24$  hours, 25.2% presented after 24-48 hours, 6.1% presented after  $\geq 48$  hours [18].

Saxena, et al. reported that 24.0% of pediatric eye trauma cases had presented within 6 hours of injury, while 34.3% had presented after more than 24 hours [13].

Al-Wadeai, et al. reported that 56.0% of patients presented within 24 hours, 37.3% presented between 24 hours and 1 week, and 6.6% presented after one week from the time of trauma [7].

Soliman & Macky reported that 12.0% of pediatric eye trauma patients presented after 24 hours, and 6.0% presented 1 week after the time of trauma [19].

El-Sehta & Seleem in Tanta study reported that 54.8% of pediatric eye trauma of their study presented to hospital before passing 24 hours since trauma occurrence, and 45.2% presented to hospital after 24 hours since occurrence of eye trauma, with insignificant difference in the time of presentation to the hospital [8].

#### **Which eye & eye part affected by the trauma?**

The current study concluded that left eye more affected by trauma than the right eye. (65.6% vs 34.4%) respectively. Mallika, et al. reported that left eye was involved in 43.3% of cases, while right eye was involved in 46.4% of cases [19].

Regarding the final diagnosis of the current study cases, the findings illustrated that corneal wounds recorded the highest figure (90.6%) of the total cases, hyphema (29.7%), sclera & lens injuries represented 25.0% for each, hypopyon (9.4%), Intraocular Foreign Bodies (IOFB) (6.3%). Soliman & Macky in Kasr El-Aini study

reported 53.6% for corneal laceration, 20.9% for corneal abrasion respectively, iris prolapse in 36.6%, traumatic hyphema 33.3%, scleral lacerations in 9.8% [18].

The study findings revealed that iris affected by the trauma in 54.7% of cases, compared with 40.6% for pupil, 35.9% for vitreous, and 9.4% for retina.

Kirti Singh, et al. reported that 32.0% of their study cases presented with anterior chamber affection, pupil had been affected in 52.0% of cases, 16.0% of cases presented with vitreous hemorrhage [20]. Abd-Elmonem in Mansoura study reported 31.9%, 31.1%, 26.5% for corneal wound, corneal ulcer, and corneal FB respectively [17]. The same study reported 11.5% for scleral wound, 12.8% for corneoscleral wound, 8.8% for iris prolapse, 2.6% for vitreous prolapse, 1.1% for retinal detachment, 3.9% for conjunctival wound [16]. Rohit Saxena reported corneal abrasion and/ or laceration in 30.0% of study cases, corneal foreign body in 28.0%, corneal perforation in 44.0%, corneoscleral perforation in 43.0%, scleral perforation in 19.0% of study cases, vitreous hemorrhage in 8.0% [13].

The variation in reported figures may be due to variation in study methodology or due to variation in sociocultural backgrounds of the study cases.

#### **Surgical treatment offered to study cases:**

Regarding the surgical treatment offered to study cases presented at Ophthalmology Department, Assiut University Hospitals, the results of the current study illustrated that vast majority of cases (81.3%) subjected to repair of corneal wound, while irrigation/ aspiration of hyphema represented 26.6%, followed by irrigation/ aspiration or rupture cataractous lens which represented 21.9%, then repair of scleral wound represented 15.6%, vitrectomy (anterior or core) represented 10.9% and lastly other surgical procedures such as irrigation/ aspiration of pupillary membranes, reposition of prolapsed iris and intravitreal injection of steroids or antibiotics represented 6.3%.

Al Wadei, et al. study reported that all patients received medical treatment (intravitreal and systemic antibiotics), only 3.8% of eyes received medical treatment alone, 96.2% received surgical treatment. Also, they reported that 25.0% of patients required corneal repair and 15.0% required scleral repair. The same study reported

that 75.0% of the eyes were subjected to surgical intervention required secondary intervention at a later time, which included lens extraction and intraocular lens implantation in 31.0% of cases, vitrectomy for vitreous hemorrhage in 4.0% of cases, vitrectomy and IOFB removal in 7.0% of cases (4.0% with endophthalmitis), vitrectomy for retinal detachment surgery in 12.0% of cases, and removal of hyphema in 8.0% of cases [7].

Soliman & Macky reported that 56.0% of their study cases underwent corneal repair, 27.5% underwent scleral repair, 5.2% underwent lens removal, 4.6% underwent removal of hyphema, 4.6% underwent lens removal & IOL implantation, 4.6% underwent vitrectomy & FB removal, 3.3% underwent iris reposition, 1.3% underwent retinal detachment surgery, and 0.7% underwent vitrectomy [18].

Franzco et al., in Australia study reported that all open globe injury cases underwent primary wound repair of the laceration, 14.8% of eyes underwent lensectomy with vitrectomy at the time of primary repair, and 2.5% of eyes were treated for endophthalmitis [9].

#### **Outcome of eye injuries in the present study:**

First of all, visual acuity (VA) measurement had been used as an indicator for vision improvement of the traumatized cases recruited in the current study. In fact, only 51 cases out of the total 64 study cases were subjected to VA measurement. The other 13 young cases who did not have VA measurement, excluded from this assessment.

According to documented improvement in VA of the study cases, the results of the current study illustrated that 49.0% of cases get improved, versus 51.0% for not improved cases. Similar studies for instance, Kirti Singh, et al. study reported good visual outcome in 50.48% of their study cases versus 49.52% for poor visual outcome [20]. Rohit Saxena, et al. reported improvement in visual acuity of 6/12 or better in 15.45% of open globe injuries at the end of 6 months follow-up period [13].

An Indian study conducted by Shazia Qayum, et al. reported that 49.0% of their study cases got improved after one-week treatment, regarding the improvement in visual acuity (38.3% had visual acuity 6/6-6/18, 10.7% with visual acuity <6/18-3/60), and 34.4% had blinding visual outcome even with best operative procedure and



management [11]. Subina Narang, et al. reported that visual acuity of >3/60 in the injured eye at the last follow-up examination was recorded in 52.86% of patients whose visual acuity could be tested [21].

Al-Wadeai, et al. reported some improvement in their study cases, where 88% of poor vision was reduced to 68.75% and the moderate vision increased from 12% to 16.25% and the good vision increased from zero to 15% [7]. Puodžiuvienė, et al. in Lithuanian study reported 48.5% of their study cases regained a visual acuity of 0.5 or better [14].

## 5. CONCLUSION

The present study is an observational, analytic, follow-up, hospital-based study. The study has been conducted at Ophthalmology Department of Assiut University Hospitals during a period extended from the beginning of July 2016 to the end of June 2017. The study aimed to investigate the ocular injuries among a quota sample of 64 patients aged less than 18 years to investigate the socioeconomic backgrounds of the study participants, as well as, the etiology, pattern, management, and outcome eye injuries. Data of this study have been collected through personal interviews with patients themselves, or with their relatives depending on the situation.

Study findings illustrate that VA of only 49.0% of the study cases get improved. The improvement was better among cases aged  $\geq 10$  yrs, males, and rural inhabitants. Regarding the relationship between place of eye trauma incident and outcome of VA among study cases, results revealed that improvement was better in home accidents, where the level of improvement was 64.0%, compared with 36.0% & zero percent for street and workplace accidents respectively, with significant statistical difference (P-value) = 0.037.

The study concluded that early seeking of ophthalmic intervention has a positive effect on the outcome and prognosis of pediatric ocular injury.

## 6. RECOMMENDATIONS

**Based on the results of the current study, the researchers recommend the following:**

Eye injury cases should seek ophthalmic consultation as early as possible (such approach

will improve the outcome and prognosis of eye casualties).

Eye injuries should be an integral component of accident topic in the curricula of basic education.

Eye injuries should be an integral component of the non-communicable diseases' surveillance program.

Eye injuries should be an Integral component of the National Injury Prevention Program.

Developing a database for eye injury statistics with special emphasis on pediatric issue (this will offer a good resource to health planners and policy makers to design an effective and efficient preventive program for eye injuries).

## CONSENT AND ETHICAL APPROVAL

The current study had been approved by Ethics Review Committee of Assiut Faculty of Medicine. Before data collection from patients through personal interviews with patients themselves or with their caregivers. The aim of the study had been explained to them, and then, were invited them to participate in the study. A written consent from the patients or their caregivers was obtained.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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