

CASE STUDY

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EPIDEMIOLOGICAL ATTRIBUTES TO EYE INJURIES: A PERSONAL EXPERIENCE OF OCULAR EMERGENCIES IN SOUTH EAST ASIA AND AFRICA: A THREE-YEAR AUDIT

Adarsh Bhardwaj¹, Christina Gellknight¹, Kamal Narain¹, Vaibhav Dubey², Alok Semwal^{3*}¹AIMST University, Bedong, Kedah, Malaysia.²Volhart Health Care Pvt. Ltd., Department of Research and Development, Lucknow, UP, India.³College of Pharmacy, Shivalik Campus, Dehradun, UK, India.Received: 20 Jan, 2022
Accepted: 22 Mar, 2022***Correspondence to:
Dr. Alok Semwal, PhD**Email: alok.semwal@copdoon.org

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Web: www.ozziepublishers.com**Abstract**

Aim: This study is based on our personal experience of Ocular emergencies in hospitals of South East Asia and Africa before joining AIMST University in 2018. We aim to determine numerous epidemiologic and clinical characteristics of the eyes with injuries, their etiology, and associated risk and outcome. **Methods:** This study is retrospective and observational. It includes multiple activities related injuries due to domestic work, sports, and assault. The data was recorded in the eye clinics of the hospitals over the period of 3 years i.e., January -2002 to December-2004. Data of injuries were documented based on subjects with the following criteria: (1). Age & Sex (2). Activity at the time of injury (3). Use/no use of protective eye gears (4). Complete anterior and posterior segment examinations of the eyes (5). Visual acuity after injury (6). Need for emergency surgery or hospital admission for observation. **Results:** The study included 257 patients with ocular trauma. Out of which 212 i.e., 82.49 % were males and 45 i.e., 17.57 % were females including children. As per the recorded data via multi-variable logistic regression revealed the most affected age group was 6-12 years and 21-30 years respectively, requiring around 3 to 4 follow up appointments. As a whole, Blunt Trauma (BT) was the major cause of eye injury resulting in (n=42) inpatients i.e., 16.34% while Intraocular foreign bodies (IOFB) with the least number of (n=2) inpatients i.e. 0.78 %. The related causes to eye injury were mostly unknown i.e., 43.36%, followed by trauma during domestic/leisure activity 24.22%, while injury through sports activity were the lowest i.e., 3.50 %. Among the subjects, (n=12) 29.27% working in Palm oil plantations suffered the highest eye injuries in contrast to only (n=1) patient 2.44 % working in rubber industry, without using protective eyewear at the time of injury. The patients were evaluated for their injury of the anterior and posterior segment of the eye. **Conclusion:** The domestic/leisure activities were the major cause of most ocular injuries as reported in our study, followed by work/occupation related injuries. The patients who faced major risks being workers of the palm oil industries and in various workshops, field laborer's, farmers, grass-cutters etc. Injuries in the male population were more than in females. Precautions (like using protective eye gears) are to be considered seriously during leisure activities also to prevent ocular injuries.

KEY WORDS: Blunt Trauma (BT), Intraocular Foreign Bodies (IOFB), Domestic/Leisure activities, Eye Injuries, Work/Occupational injuries, Protective Eye Gears.

INTRODUCTION

Ocular trauma cases are frequently seen in eye clinics all over the world. It is one of the leading causes of man hour loss and often results in visual disabilities. As per, WHO's Prevention of Blindness Program, an estimated 55 million individuals suffer from ocular trauma/disablement every year, to which 750,000 required hospital admission inclusive of 19 million-unilateral blindness, 2.3 million with bilateral low visual acuity, 200K open globe injuries and 1.6 million injury-based blindness[1-3].

A report by Zainal *et al*, 2002[4] in National Health and Morbidity Survey in year 1996 showed 0.29 % prevalence of complete blindness & 2.44 % of poor vision across the country. While, cataract was marked still as the major cause of blindness with 58.6%, sequentially followed by retinal diseases 24.5 %, diabetic retinopathy 10.4 %, Glaucoma (6.6 %) and refractive errors 4.1%[5-7].

It has been witnessed that the origin of maximum ocular injuries is at work places including domestic and leisure activities (43.6%) followed by sports activity (29 %), road

mishaps (23.1 %), domestic accidents (17.7 %) etc. Usually, 72 % of injuries are caused by sharp/high powered tools as compared to blunt objects with 27 % [8-10].

In the past, very few studies conducted in Malaysia had reported data related to eye injuries. Study by Thomas and Isa involving 385 construction workers aged between 18 to 65 years reported 66.20% ocular injuries which included 28.20% of foreign body injuries, 9.20 % conjunctivital hemorrhage, 4.75% corneal haze, 1.78% lacerations, 1.18 % cornea burns and 0.29% of traumatic cataract [11].

Similarly, retrospective study by Madhusudhan *et al.* for 10 years featuring 220 patients revealed 51.8% eye injury occurred at home along with 23.4 % at workstations, 18.5 % at street and 2.7 % at school. The cause of injuries was mainly domestic that was 37.4%, the occupation based in 23.4%, motor vehicle accidents in 17.6 % & 12.6% was related to animal husbandry/agriculture. According to the data, metal (27%) was major injury causing object other than glass (16%) and sticks (10%) [12]. Moreover, a 11-year retrospective study in the hospital at University Sains Malaysia with 29 traumatic cataract patients below 17-year age showed 62.1 % caused by penetrating injury, 24.14 % due to organic foreign body with infection, followed by falling, fishing rods & various metallic tools showing 10.34%, while the reason for injury was unclear in the under five-year age group 13.80 % [13].

Study at the University of Malaya Medical Centre in 546 subjects with average age of 31.5 years, showed 43.6 % ocular injury due to work related activity. Eye injuries were usually caused by high-powered tools 30.8% followed by road/vehicle accidents 23.1% & domestic mishaps 17.7 % [10]. Three years of prospective study by Thevi *et al.* 2012 [14] with patients mean age of 27 years showed 36.5 % ocular injuries at workplaces followed by road accidents 32.7%. The most common cause of injuries was by pencil and toys 36.5 % followed by glass and nails (15.4 %). The types of injuries observed in these patients were corneal lacerations 61.5%, corneoscleral lacerations 26.9%, scleral lacerations (11.5%) with hyphemia, IOFB and traumatic cataract.

Similarly, a ten-year retrospective study in university hospital of Malaysia, Kuala Lumpur involving 64 patients with IOFB injuries were predominately males under the age of 35 years. In this study it was observed that trauma by hand hammer occurred in 64%, grass cutting in 20.3% of patients resulting in poor visual outcome due to iris damage, intraocular hemorrhage etc [15].

The present study aims to determine the incidence, Etiology, associated risks, and visual outcome of ocular injuries.

METHODS

The current observational study was done over a period of three years before my joining AIMST University in 2018. Patients primarily visiting the hospital for first time were accounted in the study excluding those from other hospitals or with past follow up treatment appointments. The details of the patients/ocular injury were recorded in an in-house developed well sequenced proforma. The proforma included the gender/age distribution (adult and pediatric age group), the segment of the eye affected by the injury/type of injury, the activity/occupation, the workplace, the use of protective gears at the time of injury and lastly, the visual acuity of hospitalized patients.

Further, the ocular injuries were listed into the following categories such as work/occupation, sports, domestic/ leisure activities, road accidents, assaults/abuse and unknown/unintentional. In regard to the categorically divided ocular injuries, it is further classified, such as injury by blunt/sharp object, motor vehicle accident, fall, chemical, sand, metal bar, nozzle pipe, burns, sports equipment like balls, shuttlecock etc. Moreover, the diagnosis of the injury was also done according to the type of injury such as blunt trauma, corneal abrasion, lid laceration, perforated cornea, corneal ulcer, IOFB, black eye etc.

The extrapolated Data was recorded comprehensively based on the patient's eye evaluation along with documented photographs, defining the causes of injury (**Appendix**). Finally, best corrected visual acuity (BCVA) was also recorded and categorized as follows: 6/6-6/12, 6/18- 6/60, CF (counting fingers)- HM (hand movement) and PL (perception of light)-NPL (no perception of light) for all inpatients.

RESULTS

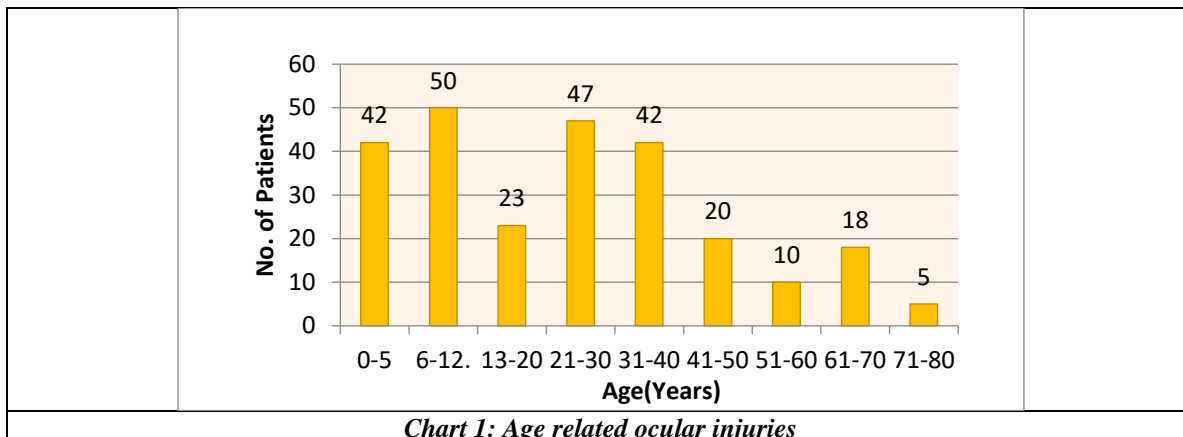
The current study involved 257 new patients, presented at the hospital with ocular trauma. Out of these 73.9 % (n=190) of patients needed immediate admission, whereas 26% (n=67) of patients were given primary treatment and were advised to follow up at the OPD (outpatient department). The gender distribution of 257 patients was 82.49% (n=212) males and 17.57% (n=45) females including children (**Table 1**). The male to female ratio was recorded as 4.6:1. The patients with injury to the right eye were 52.1% (n=134), while in 35.7 % (n=92) left eye was injured and the remaining 12.2 % (n=31) were involved with injuries to both eyes to some extent.

	MALE	FEMALE
Children	76	16
Adult	136	29
Total	212	45
Percentage (%)	82.49 %	17.57 %

Table 1. (%) Gender Distribution

In context to (Table 2; Chart 2), which shows the patients age distribution from of 0 to 80 years with an average age of 40 years old. It can be observed that the highest incidence of ocular injuries was among the patients between the ages of 6-

12 years i.e. 19.45 % (n=50) followed by 21-30 years 18.28 % (n=47) and the lowest incidence was seen between the ages of 71-80 years, 1.94% (n=5).

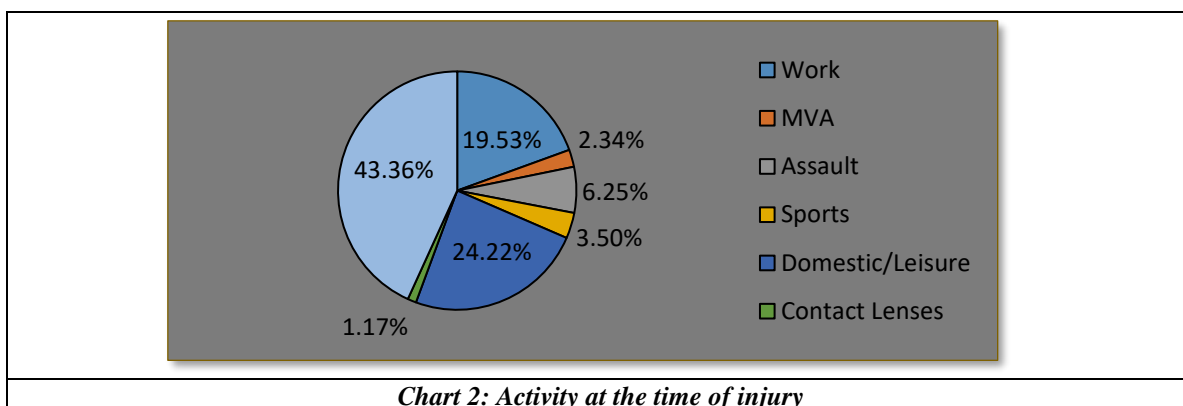


Age (Years)	No. of Patients	Percentage (%)
0-05	42	16.34
6-12	50	19.45
13-20	23	8.94
21-30	47	18.28
31-40	42	16.34
41-50	20	7.78
51-60	10	3.89
61-70	18	7.00
71-80	5	1.94
Total	257	100

Table 2. (%) Age related eye injuries

In 43.36% of the patients in the study the cause of injury was unknown because it involved mostly children and some patients did not want to tell the cause of injury because of family reasons, followed by domestic and leisure activities in 24.22%, work related in 19.53%, assault in 6.25%, sports in

3.50%, MVA (motor vehicle accident) in 2.34% and lastly injury through contact lenses in 1.17% (Chart-2).



Based on the diagnosis, there were number of patients with multiple type of ocular trauma, treated as inpatient or

outpatient based on the severity of eye injuries. Out of 257 patients 73.9 % (n=190) were inpatients whereas 26% (n=67)

outpatients. The minor ocular injury cases were treated as outpatient and serious eye injuries as in patients. Blunt trauma (BT) was most common trauma to the eye 16.34% (n=42) causing lid swelling and ecchymosis in 16.34% (n=42), laceration of lids, traumatic cataract and ruptured globe. Lid laceration (LL) was observed in 12.50% (n=32), Perforated cornea (PC) 11.33% (n=29), Corneal ulcer (CU) 10.55% (n=27), Chemical injury (CI) 5.86% (n=15), Hyphaema 5.08% (n=13), Traumatic cataract (TC) 4.30% (n=11), Black eye 1.95

% (n=5), Perforated Globe (PG) 1.95% (n=5), Motor vehicle accident (MVA) 1.17% (n=3), Intraocular foreign body (IOFB) 0.78% (n=2) and lastly some of the injury types were unknown in 2.34% (n=6) cases. On the contrary, 14.45 % (n=37) patients with Corneal abrasion (CA) required no hospital admission followed by Subconjunctival hemorrhage (SH) 8.20% (n=21) and Corneal foreign body (CFB) 3.52% n=9 (Table 3; Appendix 1).

Diagnosis	Inpatient	Outpatient	Total	Percentage (%)
Blunt Trauma (BT) with ecchymosis & Lid swelling	42	0	42	16.34
Corneal Abrasion (CA)	0	37	37	14.45
Lid Laceration (LL)	32	0	32	12.50
Perforated Cornea (PC)	29	0	29	11.33
Corneal Ulcer (CU)	27	0	27	10.55
Sub-conjunctival Hemorrhage (SH)	0	21	21	8.20
Chemical Injury	15	0	15	5.86
Hyphaema	13	0	13	5.08
Traumatic Cataract (TC)	11	0	11	4.30
Corneal Foreign Body (CFB)	0	9	9	3.52
Black Eye with periorbital hematoma	5	0	5	1.95
Perforated Globe (PG)	5	0	5	1.95
Motor Vehicle Accident (MVA)	3	0	3	1.17
Intraocular Foreign Body (IOFB)	2	0	2	0.78
Unknown	6	0	6	2.34
Total	190	67	257	100

Table 3. (%) Types of injury cases with inpatient and outpatient details

Lid Laceration (LL) and Hyphaema were more common ocular injuries amongst the children i.e., 8.17% (n=21), and

3.11% (n=8) respectively followed by unknown type of injuries 2.34% (n=6) as compared to adult cases (Chart 3)

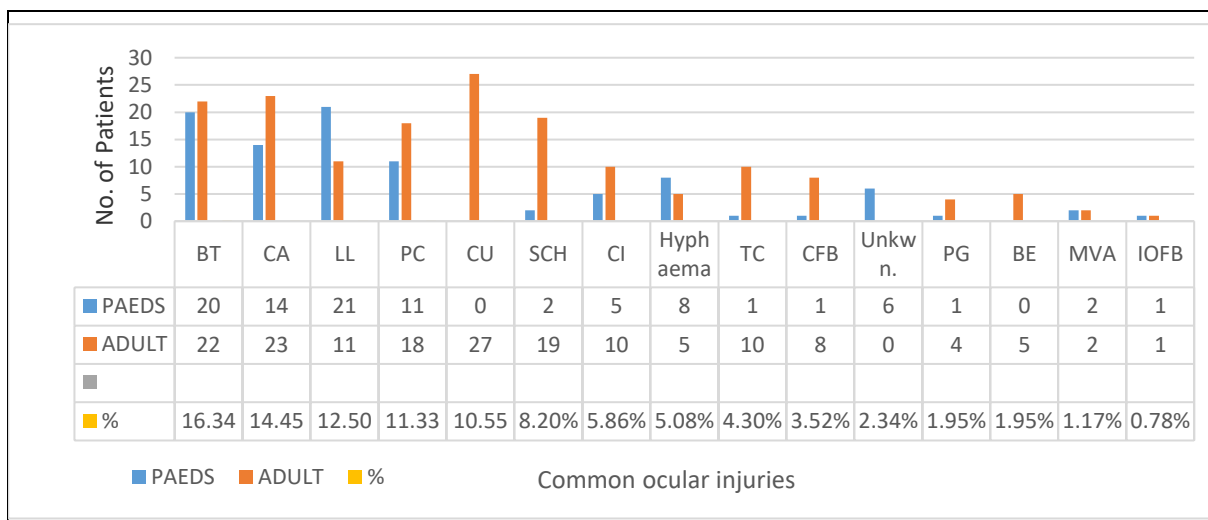


Chart 3. A comparative data of the adult to pediatric groups of ocular injury patients with total percentage of respective type of cases.

Abbreviations: (BT)-Blunt trauma, (CA)-Corneal abrasion, (LL)-Lid laceration, (PC)- Perforated cornea, (CU)- Corneal ulcer, (SCH)-Subconjunctival hemorrhage, (CI)-Chemical injury, (TC)-Traumatic cataract, (CFB)-Corneal foreign body, (PG)-Perforated Globe (BE)-Black eye, (MVA)-Motor vehicle accident, (IOFB)-Intraocular foreign Body.

The primary assessment of the patients suggested that the anterior segment was mostly affected in 76.43% (n=196) resulting with injuries of the Lids, Conjunctiva, Cornea, Anterior Chamber, Iris, and Lens. Whereas injury of the posterior segment was in 23.7 % (n=61) of patient's eyes

involving Vitreous, Retina, Choroid, and Optic nerve. Our study analyzed ocular trauma based on patient's occupations. It was observed that (n=41) of patients in different working environments did not use requisite protective gears. The highest number of patients being 29.27% (n=12) palm oil

estate workers followed by various workshop workers 26.83% (n=11), field laborers or farmers 17.07%

(n=7), metal tinkers 12.20% (n=5), grass cutters 9.76% (n=4), lastly welders and rubber tappers with each 2.44% (n=1) respectively (**Table no.4**).

Patient occupation at the time of injury	Number of Patients	Percentage (%)
Palm oil estate workers	12	29.27
Workshop workers	11	26.83
Field laborers/farmers	7	17.07
Metal Tinkers	5	12.20
Grass Cutters	4	9.76
Welders	1	2.44
Rubber Tappers	1	2.44

Table 4. Occupation of the patients at the time of injury with no protective gears

There were multiple modes of ocular injury in patients working in their occupational fields. The number of patients that had different source of injury were fifty (n=50). The

highest number being (n=12) 24.0% injured by palm oil branch, followed by metal bar 14.0% (n=7), stone 6.0% (n=3), chemical 4.0% (n=2) and Grinding metal 6.0% (n=6) (**Table 5**).

Source of injury	No. of Patients	Percentage (%)
Palm Oil Branch	12	24
Metal Bar	7	14
Stone	3	6
Chemical	2	4
Sand	2	4
Fall/Accident	1	2
Wire	3	6
Nozzle pipe	1	2
Grinding metal	3	6
Maize	1	2
Tree branch	2	4
Spanner	1	2
White crane	1	2
Coconut	1	2
Bamboo	2	4
Nail	2	4
Stick	1	2
Wood	3	6
Leaf	1	2
Welding Spark	1	2
Total	50	100

Table 5. Mode of eye injury in the patients at the time of work/occupation

The study also showed that total of (n=9) patients had ocular injuries due to various sports activities. In (n=4) patients who sustained trauma while playing football had periorbital, conjunctival, corneal and posterior segment eye injuries. There were patients injured by shuttlecock (n=2) and by catapult who

suffered injury to periorbital region, posterior segment of the eyes and injury to the cornea respectively. There was one patient (n=1) who had injury to the conjunctiva while riding a bicycle (**Table 6**).

Sports Activity	Periorbital	Conjunctival	Corneal	Posterior Segment	Rupture	Total
Football	1	1	1	1	0	4
Shuttlecock	1	0	0	1	0	2
Catapult	0	0	2	0	0	2
Bicycle	0	1	0	0	0	1
Total	2	2	3	2	0	9

Table 6. Eye injuries along with affected region during sports activities

The final best corrected visual acuity (BCVA) of all (n=190) patients admitted in the hospital was recorded and categorized as follows: 6/6-6/12, 6/18- 6/60, CF (counting fingers) - HM (hand movement) and PL (perception of light)-NPL (no perception of light). Amongst all the admitted patients, 62.1% (n=118) the average visual acuity recorded was 6/6 to 6/12. In

26.8% (n=51) patients, the visual impairment was recorded from 6/18 to 6/60. Moreover, in 8.42% (n=16) patients, the visual acuity ranged from counting finger (CF) to hand movements (HM) and lastly, in 2.63% (n=5) patients, the visual acuity was recorded as perception of light (PL) to no perception of light (NPL) (**Table-7**).

Visual acuity (BCVA)	Work	Domestic & Leisure	Sports	Assault	Motor Vehicle Accidents (MVA)	Unknown	Total
6/6-6/12	32	52	9	16	3	6	118
6/18-6/60	20	26	0	4	1	0	51
CF-HM	6	6	0	2	2	0	16
PL-NPL	2	3	0	0	0	0	5
Total	60	87	9	22	6	6	190

Table 7. Patient's activity based final visual acuity of Inpatients

Abbreviations: CF (counting fingers)- HM (hand movement) and PL (perception of light)-NPL (no perception of light).

Discussion

The major findings in our study showed that the ocular trauma was commonly seen at the eye department of the Hospitals were injuries by domestic/leisure activities, occupation related, assaults, sports, and motor vehicle accidents. Thereby causing significant damage to individual quality of life in terms of financial, physical, and mental wellbeing. The current study involved a small number of patient size of (n=257) over the period of 3 years.

Our study (**Table 1**) suggested that male population were predominantly highest in sustaining ocular trauma i.e., 82.49% of all cases. Others also observed that the male domination in ocular injuries varied from 75% to 90% [16,10,7]. The reason being more involvement of male population in various livelihood occupations, sports, assaults, use of drugs or alcohol, and aggressive behaviors. The other reason causing occupational hazards being callous attitude to use protective eye shields and gears.

Injuries to the right eye in our study were more prevalent (n=134) 52.1% in comparison to left eye (n=92) 35.7% which was like the study done in Nigeria [17-18] and in Malaysia [7]. However, it was contrary to the study done in Nigeria [18] where 56.2% injuries were on the left eye and 43.8% were on right eye respectively.

Trauma to anterior segment of eye in our series 76.43% (n=196) (**Figure 1**) was higher than posterior segment 23.7% (n=61) (**Figure 2**). This correlates with the study done Adlina *et al.* [12] who reported open globe injury in 10 years span also observed anterior segment trauma more than the posterior segment of the eye.

Lid laceration was the main ocular injury (n=21) in pediatric age group in our study. It was caused by fishhook injury (**Appendix**) and spring cradle injury. It occurred in elder sibling while watching the baby sleeping in the spring cradle, whereby the eye lashes of the observing child were caught in the spring of the cradle and caused laceration of the lid (**Appendix**). Lid injuries were also found in adults in our study but in smaller numbers (n=11) by metal bars, nozzle pipes, and bamboo tree branches etc. Eye Injuries by blunt trauma were

almost equally prevalent both in children (n=21) and adults (n=22) in our study. We found that there were two Intraocular foreign body (IOFB) cases in this series one each in adult and pediatric age group (**Chart 3**) caused by wood splinter and gunshot wound respectively (**Appendix**). Barry *et al.* 2019 in the United Kingdom reported high number of lid lacerations (n=24) and same number (n=1) IOFB in pediatric age group out of 86 cases. In a study by Puodžiuvienė *et al.* [19] it was observed that pediatric age group was affected in 40.3% (n=108) amongst all type of injury cases in the series. In specific to IOFB injury in children, a study by Yang *et al.* [20] showed firecrackers (36.7%), followed by metal splatters (31.1%) resulted in the greatest number of IOFB cases amongst 484 subjects. It was observed that IOFB cases in adults were found to be the least (11%) in his case series of 27,467 patients seen over 12 years period [21]. Ocular trauma occurring at the workplace in our study was 29.53% (n=12), that was caused while working in palm oil estates, followed by metal bar injuries at workshops 26.83 % (n=11).

Motor vehicle accident (MVA) and contact lens based ocular injuries in our study were least with 2.34% and 1.17% respectively (**Chart 2**). In and another study by Soong *et al.* [10] it was observed that 43.6% of work-related injury in the series of (n=238), were caused by high powered tools 30.8% followed by motor vehicle accidents (MVA) 23.1%.

Eye injuries during sports-related activities in our study showed in 2.34% (n=9) patients (**Table 6**). Among these (n=3) patients were found with corneal abrasions while playing football (n=1) and Catapult (n=2) (**Table 6**) in comparison to study by Mallika *et al.* [7] indicated that 2.50% (n=6) patients' injury was with shuttlecock and one patient with rugby related ocular trauma.

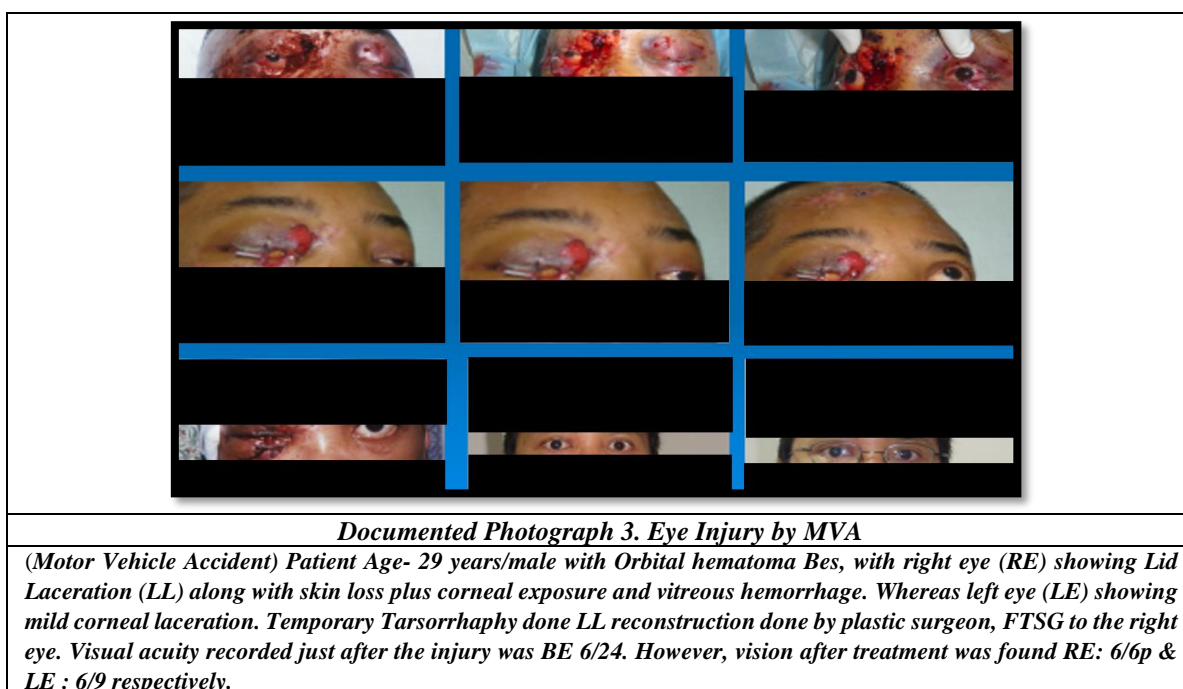
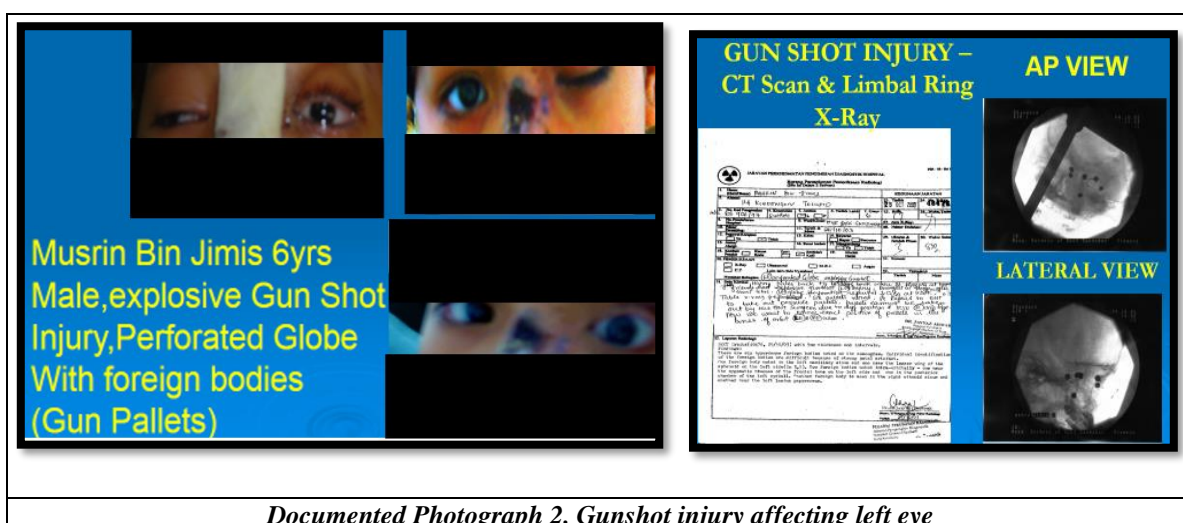
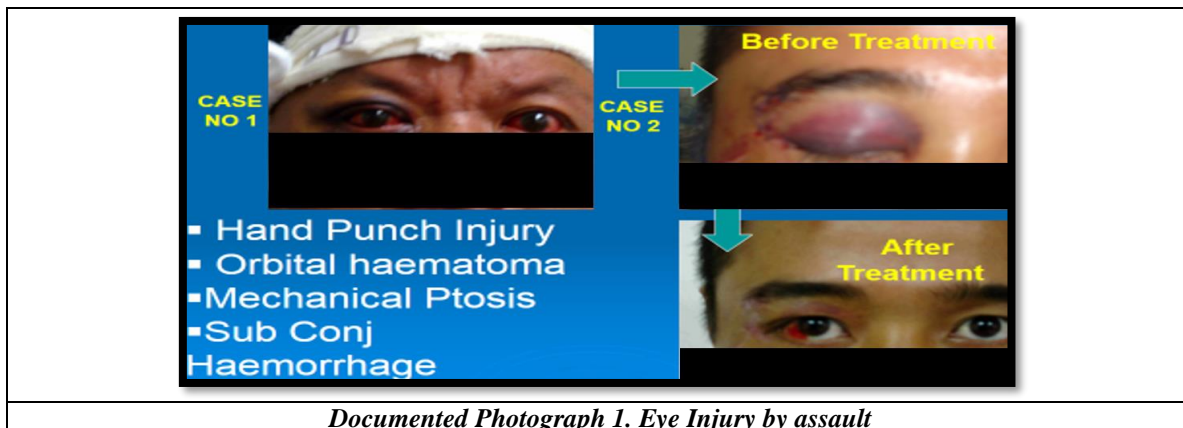
The activity based final best corrected visual acuity (BCVA) of all admitted patients (n=190) was recorded (**Table 7**). In this series (n=118) patients had visual acuity 6/6-6/12. While (n=51) patients had significant visual impairment (Visual acuity 6/18-6/60). This was followed by (n=16) and (n=5) patients with dismal visual acuity to just CF (counting fingers)- HM (hand movement), and PL (perception of light)-NPL (no perception of light) respectively.

CONCLUSION

In reducing eye injuries, there is still a wide scope for improvement, if the eye-protecting gears are worn during industrial, sports related and household activities. The frequency of ocular trauma has been more in developing countries compared to developed ones, where use of more efficient protective shields and tools are used. There is also a greater public awareness to eye injuries and its underlying negative impact in day-to-day life. Multiple studies showed that the persistent high risk of male population to eye related injuries in comparison to females and children. Injuries seen in our study mostly were during domestic/leisure and occupational activities suggesting strict legislation and mass awareness for personal protective gears use. Moreover, awareness through educative posters at schools, industries, mills, healthcare centers, shopping malls, hospitals etc. could bring down ocular trauma cases in every age group. This study emphasizes that domestic/leisure activities may also cause eye injuries and necessary precautions are to be observed during leisurely activities to prevent ocular mishaps.

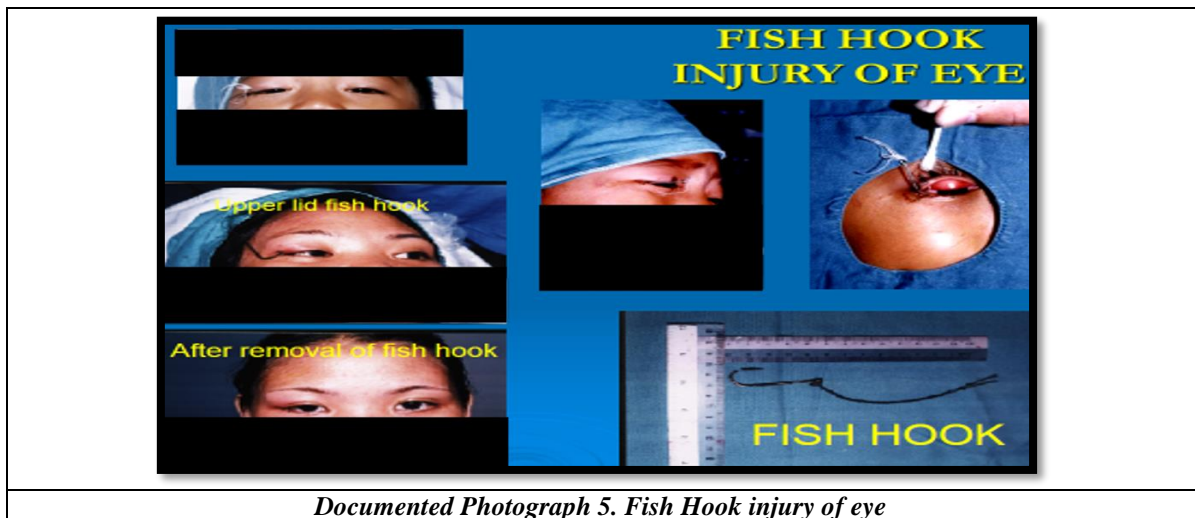
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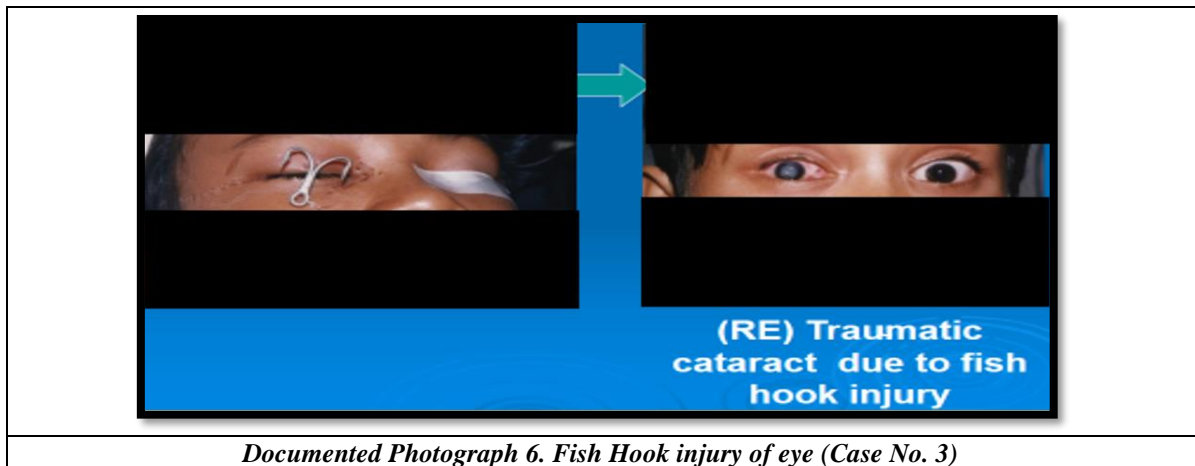




Documented Photograph 4. Spring cradle injury



Documented Photograph 5. Fish Hook injury of eye



Documented Photograph 6. Fish Hook injury of eye (Case No. 3)

Cite article as: Bhardwaj A., Gellknicht C., Narain K., Dubey V., Semwal A., Epidemiologic attributes to eye injuries: a personal experience of ocular emergencies in South East Asia and Africa: a three-year audit. Res Pharm Health Sci. 2022,8(1):170-178. Doi: 10.32463/RPHS.2022.v08i01.01