Original Article

Profile of Ocular Injury among Paediatric Patients in a Tertiary Institution in Uyo, Nigeria: An 18 Months Review

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Abstract

Background: Ocular injury is one of the known causes of acquired blindness in children. The epidemiological data of childhood ocular injury vary from region to region, and also with sex and age.
Methodology: Clinic records of pediatric ocular trauma patients (0–18 years) were reviewed for 18 months. Information on sociodemographics, causes of trauma, mechanism of trauma, place of injury, and type of injury were extracted. Data obtained were analyzed using STATA version 12.
Results: Sixty patients aged 0.5–18 years, mean age was 9 years ± 4.73 visited the hospital on account of eye injury formed the study population. Males were 37 (61.7%) and females 23 (38.3%) in a ratio of 1.6:1. The most common age group for ocular trauma was 6–10 years 24 (40.0%). Closed globe injuries were the most common type 48 (80%), home 45 (71.7%) was the most common location where injury occurred, the conjunctiva was the most commonly affected structure 21 (35%) and the most common offending object used was stick 9 (15.0%).
Conclusion: Paediatric eye injury has age-specific pattern, occurred more commonly in males, mainly of the closed globe variety and occurred mostly at the home setting.
Keywords; Children; Epidemiological; Eye Injury; Nigeria; Profile.

Introduction

The human eyeball is a reasonably well-protected structure with many physiological and anatomical factors. The bony orbit with its elastic fatty tissue as well as the eyelids provides the anatomical protection, while the blink reflex together with the head-turning reflex and the copious lacrimation following intrusion of any irritant material give the physiological protection.[1] Despite all these protective mechanisms, eye injuries are common with different clinical presentations, causes, and visual outcome. The eyes make up only 0.1% of the total body surface and 0.27% of the anterior body surface, but its significance to society and individuals is disproportionally higher.[2] It is the third-most common organ affected by injuries preceded by the hands and feet.[2] Seven per cent of all bodily injuries as well as 10%-15% of all eye diseases result from eye trauma.[3,4]

Ocular injury is one of the known common causes of acquired blindness in children.[5] Reports have shown that about 1.6 million people are blind from eye injuries; in addition to this, 2.3 million suffer low vision in both eyes. About 19 million also have suffered monocular visual loss, making eye trauma the most common cause of monocular blindness.[6,7] The

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epidemiological data of childhood ocular trauma varies from nation to nation and also vary with demographic data like sex and age[8] Statistics from the United States of America show that eye trauma is the major cause of noncongenital unilateral blindness in persons younger than 20 years; 66% of all eye trauma occurs in persons age 16 years or younger with the highest frequency among those 9–11 years.[9,10] The Nigeria national blindness survey (2005–2007) included children between the ages of 10 and 15 years and adults 40 years and above, thus excluding the age group of 1–9 years, which is an important age group at risk of eye injury.[11]

Eye trauma in children differs from that in adults in many ways. Etiology may differ in that often, eye trauma in children is accidental as opposed to adult cases which may be intentional.

Obtaining sufficient information from children about how the trauma occurred is often a challenge, especially if the injury happened in the absence of an adult. Worse still, they may not even be aware of a reduction in their visual acuity (VA) following such trauma. This often leads to diagnostic delay, thus increasing the risk of permanent visual loss. As compared to adults, ophthalmic examination in children is very difficult, even under the best conditions, largely because of the restlessness of children and communication problems.[12,13]

A study in Enugu - South East, Nigeria on ocular injuries in primary school pupils, showed a prevalence of 7.93%, and the home was identified as the most common location of injury [14] Information on prevalence and pattern of childhood ocular injury in South - South Nigeria is scanty; therefore, findings from this study will help assess the burden of this preventable cause of childhood blindness in our environment and also identify the possible contributing factors. This study aims to find out the epidemiological factors associated with the pediatric ocular injury.

Materials and Methods

This was a retrospective study where there was review of records of all pediatrics patients (0–18 years) who presented with ocular trauma from January 2018 to June 2019 to the out-patient clinic of the Ophthalmology Department of the University of Uyo Teaching Hospital. The case files of patients diagnosed with ocular trauma were retrieved and those with incomplete data were excluded. The data extraction tool was designed to capture sex, age, cause of trauma, mechanism of trauma, place of injury, and type of injury. Age grouping of subjects was 0–5 years (preschool), 6–10 years (school age), and more than 10 years (school age and adolescent).

Measurement of VA was done with Snellen's chart or illiterate E-chart for school-going children and picture charts or matching letters for preschool children. The anterior segment was examined with a bright penlight and X7 head loupe. Dilated fund us copy was carried out using Beta 200 direct ophthalmoscope where appropriate, as stated in their case files. Grading of injury was done using the Birmingham classification (Birmingham Eye Trauma Terminology, [BETT]).[15] BETT divides ocular injuries into closed and open globe injuries (OGI). The ocular trauma score (OTS) prognostic model was used to interpret the visual outcome.[16] OTS is used to predict the visual outcome of patients in all age groups after open and closed globe injuries. Visual acuity was graded based on WHO 2013 classification[17]

[Table 1]. In calculating OTS, a value is assigned to six variables, namely: Initial VA, globe rupture, endophthalmitis, perforating injury, retinal detachment, and relative afferent pupil defect (RAPD). The scores are then divided into five different categories, which give the probabilities of attaining a range of VAs after injury. This score is helpful in counseling patients and their loved ones and also in managing their expectations. It also guides the clinician in making decisions involving complex and sometimes expensive interventions especially in resource-limited settings. OTS has a predictive accuracy of 80% [16].

Data were entered and analyzed using STATA version 12, Stata Corp., Texas, USA. Categorical data were summarized using frequencies and percentages, and the continuous data using an appropriate measure of averages and measure of dispersion. Chi-square was used to determine associations between variables. Results were presented in tables and figures.

Results

Folders of 64 patients were retrieved, but data from only 60 patients were analyzed as four folders had incomplete records.

Sixty-five eyes of 60 patients aged 0.5-18 years, mean 9 ± 4.73 years who visited the hospital on account of eye injury between January 2018 and June 2019. Of

the 60 ocular trauma patients seen during that period, males were 37 (61.7%) and females 23 (38.3%) in a ratio of 1.6:1, Table 2. The highest prevalence was seen in the age group 6–10 (40.0%); about 80% of injury to the eye was closed globe injury (CGI); 50% of cases affected the right eye only and most injuries took place at home [Table 2]. Twenty-six (43.3%) of those with CGI had VA 6/18 or better, while 15 (25%) had VA <3/60. All cases of OGI 10 (100%) had VA <3/60 [Table 3]. Two cases of chemical eye injury were recorded in infants and the recorded VA was (follow light) FF. Males sustained injuries more from sharp objects 21 (56.8%) than the females 6 (26.1%). The result was not statistically significant. The age group 6–10 years had the highest prevalence of both CGI and OGI. The least prevalence was between age 0–5 and 15–18 years. The left eye was worse affected by OGI, while the right eye was worse affected by CGI. Values were not statistically significant. Only 9 (15.0%) reported to the hospital within 24 h of the occurrence, while most reported within 1 week 23 (38.8%) and as many as 9 (15.0%) after 1 year of occurrence. Frequency distribution of the structures of the eye affected shows that conjunctiva (35%) is the most affected structure followed by cornea (28.3%) [Figure 1]. Sticks, slap/blow and fingers were the most common offending objects 15%, 13.3% and 10% respectively [Figure 2].

Table 1: Classification of visual impairment and blindness (WHO, 2003)[17]

LogMAR	Snellen	Classification
20/20	6/6	Normal vision
20/30–20/60	6/9–6/18	Mild vision loss or near normal vision
20/70–20/160	6/24–6/48	Moderate visual impairment
20/200–20/400	6/60–3/60	Severe low vision
<20/400	<3/60	Blindness

Source=Vision 2020 - World Health Organization. LogMAR Logarithm minimum angle of resolution

Table 2: Distribution of age, eye affected, type of injury and where it occurs by the sex of the patients

Variables	Sex, *n* (%)		Total (*n*=60)	Statistical indices
	Male (*n*=37)	Female (*n*=23)		
Age (years)				
. .	7 (18.9)	7 (30.4)	14 (23.3)	df=2 χ^2=2.0575 *P*=0.357
6–10	14 (37.8)	10 (43.5)	24 (40.0)	
Above 10	16 (43.2)	6 (26.1)	22 (36.7)	
Median (range)	9 (0.5–17)	9 (2–18)	9 (0.5–18)	
Eye affected				
Left eye	14 (37.8)	11 (47.8)	25 (41.7)	*P*=0.623+
Right eye	19 (51.4)	11 (47.8)	30 (50.0)	
Both eyes	4 (10.8)	1 (4.4)	5 (8.3)	
Diagnosis				
CGI	30 (81.1)	18 (78.3)	48 (80.0)	*P*=1.000+
OGI	6 (16.2)	4 (17.4)	10 (16.7)	
CEI	1 (2.7)	1 (4.3)	2 (3.3)	
Where injury occurred				
Home	25 (67.6)	18 (78.3)	43 (71.7)	*P*=0.705+
School	6 (16.2)	3 (13.0)	9 (15.0)	
Others	6 (16.2)	2 (8.7)	8 (13.3)	

CGI – Closed globe injury, OGI – Open globe injury, CEI – Chemical eye injury

Table 3: Distribution of visual acuity at presentation by type of injury of the patients

Visual acuity	CGI (*n*=48), *n* (%)	OGI (*n*=10), *n* (%)	Chemical (*n*=2), *n* (%)
FF	5 (8.3)	-	2 (3.3)
6/6or better	14 (23.3)	-	-
6/9	7 (11.7)	-	-
6/12	3 (5.0)	-	-
6/18	2 (3.3)	-	-
6/24	-	-	-
6/36	1 (1.7)	-	-
6/60	-	-	-
3/60	1 (1.7)	-	-
CF	1 (1.7)	1 (1.7)	-
HM	5 (8.3)	2 (3.3)	-
PL	3 (5.0)	3 (5.0)	-
NPL	6 (10.0)	4 (6.7)	-

FF – Follow light, CGI – Closed globe injury, OGI – Open globe injury, CF – Counting finger, HM – Hand movement, PL – Perception of light, NPL – No perception of light, CGI – Closed globe injury, OGI – Open globe injury

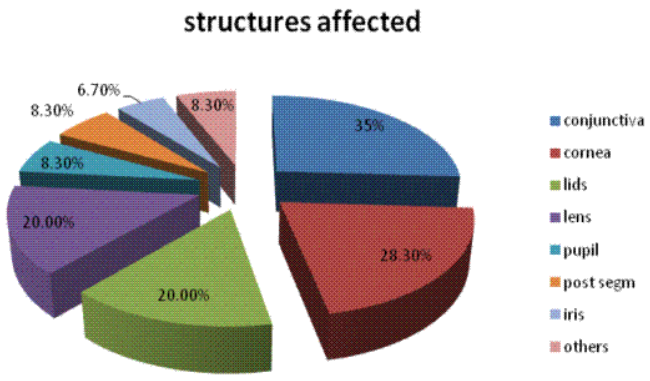

Figure 1: Frequency distribution of the structures of the eye affected among paediatric patients with ocular injury. Shows that conjunctiva is the most affected structure followed by cornea, lids and lens. Source = Original

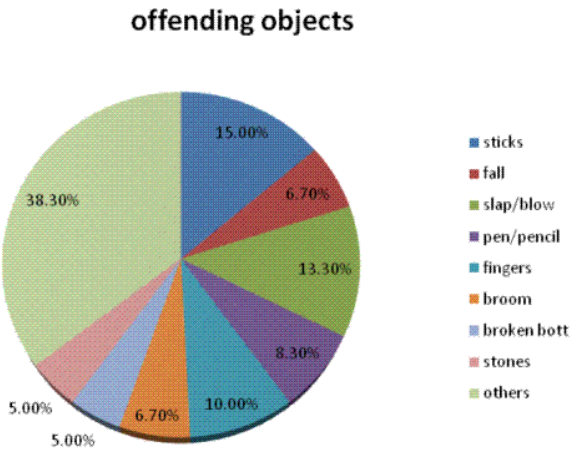

Figure 2: Frequencies of offending objects among the patients. Shows that sticks, slap/fist blow and fingers were the common offending objects: 15%, 13.3% and 10% respectively. Source = Original

Discussion

Ocular injury is one of the known common causes of acquired blindness in children. Of the 60 ocular trauma patients seen during that period, males were more female in a ratio of (1.6:1).

Earlier studies have reported male preponderance in pediatric ocular trauma.[9,18,19] This is often attributed to males being more adventurous and somewhat more aggressive in nature.[1,9]

In children 0–5 years, it was noted that the prevalence among girls (30.9%) was higher than boys (18.4%). This relatively lower ratio of males in the younger ages could be because at younger ages, both boys and girls engage in similar activities and there is closer supervision of parents/guardians on this age group.[20]The most common age group for ocular trauma in this study was 6–10 years, as buttressed by earlier studies. [4,12]Children of this age are slightly more independent and are more likely to be involved in unsupervised outdoor activities.[21]

This is the pattern seen in many developing countries,[22,23] but is contrary to the findings in India, which is also a developing economy where ocular trauma was most prevalent among those 2–6 years, and no plausible reason could be advanced for this difference.[24] In developed countries, injury is higher among adolescents largely because of increased involvement in sporting activities.25 but in this study, (36.7%) of those seen with ocular injury during the study were aged 10 years and above. The youngest age group 0–5 years were least affected in this study (23.3%), as observed in other studies[3,20] and this could be because at this age, there is still a lot of parental care and attention even during play.[25]

CGI was the most common (80%) type; this is similar to what was reported from Brazil, with CGI representing 74% of all ocular injury in their series. This distribution is also observed by earlier researchers in a prospective observational study of 96 patients in Sao Paulo, Brazil findings, which showed 74% for CGI and 6.2% for chemical eye injury.[22]The home was the most common location of injury (71.1%). This was not statistically significant P = 0.705. This is the trend, as seen in other studies as Okpala et al[14] showed that 68% of injuries in children occurred at home while 20.4% occurred in the school and Aghadoost et al[18] had43% of injuries occurring at home.

This underscores the need for proper preventive measures in the home environment as a good percentage of eye injuries can be prevented by proper supervision by adults. In contrast, El-Sebaity et al[26] found the road as a major place of injury in Egypt (54.7%).

Expectedly the presenting vision was worse with OGI as more damage results from OGI than CGI and the damage often affects both the anterior and posterior segment as corroborated by earlier studies on pediatric ocular injuries.[14,27] The OTS [16] is used to predict the visual outcome of patients after open-globe ocular trauma. Functional prognosis varies widely from no perception of light (NPL) to 6/6 vision. A higher OTS score is associated with a better prognosis. Earlier

studies on ocular trauma have shown some risk factors associated with poor visual outcome. These include presenting VA, the injury size and posterior extent of the wound, i.e., zone, the presence of RAPD, type of injury, presence of vitreous hemorrhage, lens damage, retinal detachment, the presence of an intraocular foreign body, and endophthalmitis.[28,29]

The most anterior part of the globe when the eyelid is open was most affected despite the anatomical and physiological protective mechanisms [Figure 1]. Corneal-scleral laceration, hypotony, traumatic cataract, iris laceration/prolapse, and vitreous hemorrhage were the most common presentations of OGI, while hyphema, subconjunctival hemorrhage, corneal abrasion, traumatic mydriasis, iritis, traumatic cataract, and retinal detachment were more significantly related with CGI. This is also observed in other studies.[30]The most common offending objects were stick (15.0%), slap/fist blow (13.3%) [Figure 2]. This was as a result of rough play and stick used by parents to discipline the child. A prospective study of 64 children attending an outpatient ophthalmology clinic in India and a retrospective study in Eastern Nigeria also noted stick as the most common offending object (28%),[31,32] while a study done in a tertiary institution in India found the most common etiological agents causing OGI included knife and needle.[24]

Male children were more prone to sustaining injuries from sharp objects than female children. This is perhaps because more boys play rough games than girls and often also engaged in fights than girls.[9,20] Children aged 5–9 years had the highest prevalence of both CGI and OGI, as also noted in an earlier study.[30,31,33]This study found that most cases reported late as only (15.0%) reported to the hospital within the first 24 h of sustaining the injury while most reported within 1 week (38.8%). A study in Benin had 74% of pediatric trauma cases reporting within the first 1 week.[33] Serrano et al [4]. in Columbia reported that 73.7% of children in their study population presented in the first 24 h of sustaining the injury, while 26.3% reported more than 24 h after trauma.[4] Since our study was retrospective, the real reasons for the delay in presenting at the hospital could not be ascertained, however probable reasons that are likely related to the resource-limited environment include poverty, poor health seeking behavior, ignorance, and distance from the hospital.Mallika[34]also found that a combination of social, economic as well as educational factors affected the urgency of patients presenting to the clinic or to the hospital. Serrano et al[4 or 34]opined that the main reasons for the delay in presenting to the hospital included distance (40.5%), money (22.0%), negligence (19.7%), delayed referral (10.6%), and no symptoms (9.1%).Neeta et al[1] also observed that 76% of their patients presented to the hospital within 24 h of sustaining an injury while 20% presented to the hospital between 24 and 72 h. Only 4% of the patients presented to the hospital after 72 h of injury. These were all cases of penetrating eye injury, with many of them having open globe injury.[1]

Limitation

The limitations are the retrospective and hospital based design of the study. The results may therefore not be fully reflective of patterns in the community as not all cases may report to the hospital in addition to some patients seeking care from other health facilities, traditional/patent medicine dealers, and pharmacy shops.

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References

1. Neeta M, Ajit K, Jawahirlal BA, Somen M, Sachi M. Penetrating ocular injuries in paediatric age group in a rural area of Western Maharashtra, India. *Niger J Ophthalmol* 2015; **23**:60-4.
2. Nordber E. Injuries as a public health problem in sub-Saharan Africa: Epidemiology and prospect for control. *East Afr Med J* 2000; **77**:1-43.
3. Thylefors B. Epidemiological patterns of ocular trauma. Aust N Z JOphthalmol 1992;20:95-8.
4. Serrano JC, Chalela P, Arias JD. Epidemiology of childhood oculartrauma in a northeastern Colombian region. *Arch Ophthalmol* 2003; **121**:1439-45.
5. Kaur A, Agrawal A. Paediatric ocular trauma. *CurrSci* 2005; **89**:43-6.
6. Parver LM. Eye trauma. The neglected disorder. Arch Ophthalmol1986;104:1452-3.
7. Négrel AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiol* 1998; **5**:143-69.
8. Jethani J, Vijayalakshmi P. Eye safety and prevention of visual disabilityin the paediatric age group. *Comm Eye Health J* 2005; **18**:58-60.
9. Coody D, Banks JM, Yetman RJ, Musgrove K. Eye trauma in children: Epidemiology, management, and prevention. *J Pediatr Health*

*Care*1997; **11**:182-8.
10. Niiranen M, Raivio I. Eye injuries in children. *Br J Ophthalmol*1981; **65**:436-8.
11. Kyari F, Gudlavalleti MV, Sivsubramaniam S, Gilbert CE, AbdullMM, Entekume G, et al. Prevalence of blindness and visual impairment in Nigeria: The National Blindness and Visual Impairment Study. *Invest Ophthalmol Vis Sci* 2009; **50**:2033-9.
12. Bucan K, Matas A, RinLovric, J, Batistic D, Borjan I, Puljak L, et al. Epidemiology of ocular trauma in children requiring hospital admission: A 16-year retrospective cohort study. *J Glob Health* 2017; **7**:10415.
13. Acar U, Tok OY, Acar DE, Burcu A, Ornek F. A new ocular trauma scorein pediatric penetrating eye injuries. *Eye (Lond)* 2011; **25**:370-4.
14. Okpala NE, Umeh RE, Onwasigwe EN. Eye injuries among primary school children in Enugu, Nigeria: Rural versus urban. *Ophthalmic EyeDis* 2015; **7**:13-9.
15. Kuhn F, Morris R, Witherspoon CD, Mester V. The birmingham eyetrauma terminology system (BETT). *J Fr Ophtalmol* 2004; **27**:206-10.
16. Kuhn F, Maisiak R, Mann L, Mester V, Morris R, Witherspoon CDThe ocular trauma score (OTS). *OphthalmolClin North Am* 2002; **15**:163-5. vi.
17. Gordon JJ, Allen F. The epidemiology of eye disease. 2nd ed. London: Hodder Arnold; 2003. p. 3-4.
18. Aghadoost D, Fazel MR, Aghadoost HR. Pattern of pediatric oculartrauma in kashan. *Arch Trauma Res* 2012; **1**:35-7.
19. Strahlman E, Elman M, Daub E, Baker S. Causes of paediatric eyeinjuries: A population based study. *Arch Ophthalmol* 1990; **108**:603-6.
20. Ilhan HD, Bilgin AB, Cetinkaya A, Unal M, Yucel I. Epidemiological and clinical features of paediatric open globe injuries in southwestern Turkey. *Int J Ophthalmol* 2013; **6**:855-60.
21. MacEwen CJ, Baines PS, Desai P. Eye injuries in children: The currentpicture. *Br J Ophthalmol* 1999; **83**:933-6.
22. Oiticica-Barbosa MM, Kasahara N. Eye trauma in children and adolescents: Perspectives from a developing country and validation ofthe ocular trauma score. *J Trop Pediatr* 2015; **61**:238-43.
23. Ashaye AO. Eye injuries in children and adolescents: A report of 205 cases. *J Natl Med Assoc* 2009;**101**:51-6.
24. Qayum S, Anjum R, Rather S. Epidemiological profile of pediatricocular trauma in a tertiary hospital of northern India. *Chin J Traumatol* 2018; **21**:100-3.
25. Haavisto A, Saahraravand A, Holopainen JM, Leivo T. Paediatric eye injuries in Finland – Helsinki eye trauma study 2016. *ActaOphthalmol* 2017; **95**:392-9.
26. El-Sebaity DM, Soliman W, Soliman A, Fathalla AM. Pediatric eyeinjuries in upper Egypt. *ClinOphthalmol* 2011; **5**:1417-23.
27. Russel SR, Olsen KR, Folk JC. Predictors of scleral rupture and therole of vitrectomy in severe blunt ocular trauma. *Am J Ophthalmol*1988; **105**:253-7.
28. Hugkulstone CE. Use of a bandage contact lens in perforating injuries ofthe cornea. *JR Soc Med* 1992; **85**:322-3.
29. Puodžiuviene E, Jokubauskiene G, Vieversyte M, Asselineau K.A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. *BMC Ophthalmol* 2018; **18**:10.
30. Nalini SM, Pavan G. Clinical and socio-demographical study ofpaediatric ocular injuries. *J Evid Based Med Health* 2019; **6**:1791-6.
31. Onyekonwu GC, Chuka-Okosa CM. Pattern and visual outcome ofeye injuries in children at abakaliki, Nigeria 2008. *West Afr J Med* 2008; **27**:152-4.
32. Noorani S, Ahmed J, Shaikh A. Frequency of different types of pediatricocular trauma attending a tertiary care pediatric ophthalmologydepartment. *Pak J Med Sci* 2010; **26**:567-70.
33. Okeigbemen VW, Kayoma DH. Pattern of eye injuries in children inBenin City, Nigeria Orient *J Med* 2013; **25**:1-2.
34. Serrano JC, Patricia Chalela P, Juan D, Arias JD. Epidemiology of childhood ocular trauma in a northeastern colombian region. *Arch Ophthalmol* 2003; **121**:1439-45.
35. Mallika MB. Causes and Visual Outcome of Childhood Eye Injuries Seen in a Malaysian Primary Eye Care Clinic. Kuching, Sarawak, Malaysia: 3rd World Conference on Rural Health; 1999.