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INCIDENCE AND PATTERN OF OCULAR INJURIES AT THE CHUKWUEMEKA ODUMEGWU OJUKWU UNIVERSITY TEACHING HOSPITAL AWKA, NIGERIA.

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ABSTRACT:

AIM: To determine the incidence and pattern of ocular injuries at the Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Awka, Nigeria

METHODS: This is a retrospective hospital based study carried out at the Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Awka. The case notes of new patients seen at the Eye unit of the hospital from July 2016 to June 2018 were examined. Those with eye injuries were further reviewed. Relevant information was extracted for the study. The results were analysed using the scientific calculator and presented with frequency tables and bar chart.

RESULTS: Out of the 2559 new patients seen, 156 (6.1%) had unilateral eye injuries while four patients sustained bilateral ocular trauma giving rise to 160 injured eyes. Of the 156 patients, 97 (62.2%) were males while 59 (37.8%) were females, with male to female ratio of 1.6 : 1. The age range was 6 months to 92 years, mean age 33.4 years. Fist 45 (28.8%) was the most common agent causing injuries followed by missiles 26 (16.7%). Activities leading to injuries included fighting 39 (25%), playing 22 (14.7%), vocational work 19 (12.2%) and farming 18 (11.5%). Seventy-two eyes (45%) had visual acuity of 6/6 to 6/18 and 56 (35%) had acuity of <3/60 in the injured eyes. Ocular contusion 39 (25%) was the most common diagnosis. Fifty-eight patients (37.2%) presented within 24 hours whereas 3 cases (1.9%) came after one month.

CONCLUSION: Ocular injury can be encountered in any activity engaged by man. It may be accidental or deliberately inflicted. Males and younger age group are more at risk. Fight was the most common activity leading to eye trauma in our audit. Generally, there was delayed presentation at the hospital following the injury. However, the severer the injury, the earlier the presentation.

Keywords: Incidence; Pattern; Ocular injury; Presentation.

INTRODUCTION

Injury implies damage inflicted on the body by an external force.¹ Ocular injury is any violence to the eye whether accidental or intentional. It can be seen in all ages, sexes and social classes. The setting of ocular injury can be as varied as the activities man engages himself with.

These range from the simplest to the most intricate, from vocational to recreational and from conflicts to even criminal attacks.^{2,3} Gadgets installed for safety purposes could become sources of eye trauma.^{4,5,6,7} The harm inflicted may be mild, moderate, severe and at times life-threatening. The resultant ocular morbidities could pose a burden to the affected patient and their family. The eye is

the body part through which light enters to elicit the appreciation of the physical world. Preservation of sight is therefore more cost effective than rehabilitation of the poorly sighted.⁴

Ocular injury could be mechanical, chemical, electrical, thermal or radiation in nature.⁷ The advent of the Birmingham Eye Trauma Terminology System (BETTS) in the early 2000 provided a standardized and straightforward system for classifying mechanical injury to the eye globe.⁸⁻¹⁵

The outer fibrous coat (cornea and sclera) is referred to as the eye wall. The Birmingham eye trauma terminology system (BETTS) for the classification of mechanical ocular injuries is detailed as follows:

(1). Closed globe injury: the eye wall (cornea and sclera) in this injury does not have a full thickness wound but there is intra ocular damage.⁸ It includes contusion and lamellar laceration. Contusion refers to the closed globe injury resulting from blunt trauma. Damage may occur at the site of the impact or at a distant site. Lamellar laceration is a closed globe injury characterized by a partial thickness wound of the eye wall caused by sharp object or blunt trauma.

(2). Open globe injury: this is associated with a full thickness wound of the sclera or cornea or both. It includes rupture and laceration of the eye wall. Rupture refers to the full thickness wound of eye wall caused by blunt trauma. Laceration occurs when there is a full-thickness wound of eye wall caused by sharp object and it includes penetrating and perforating injuries. Penetrating injury implies a single laceration of eye wall caused by a sharp object. Perforating injury refers to a full thickness laceration (one entry and one exist) of the eye wall due to sharp object or missile. The two wounds must have been caused by the same agent. Intra ocular foreign body is technically a penetrating injury associated with retained foreign object.⁸

Incidentally, BETTS does not consider ocular injuries due to chemicals, electricity or heat.¹⁶ Roper Hall's classification is used to grade ocular chemical burns and these range from grade I - IV.⁸ In this system, corneal appearance and limbal ischaemia are used to determine the visual prognosis. Other authors have developed a grading system for the ocular chemical injuries using different parameters or considerations.^{17,18} In Dua et al, limbal involvement in clock hours and percentage of conjunctival involvement are used to predict the prognosis of eye injuries and it ranges from grade I - VI.¹⁷

In this era of high-speed traffic and industrialization, the incidence of injuries has increased. Like any other part of the body, eyes are not exempt from these trauma in spite of the fact that they are well protected by the eye lid, projected margins of the orbit, the nose and a cushion of fat behind.⁸ Notwithstanding all these protective features,

the eye is still an external organ and so it's easily injured.¹⁹ For this reason, eye injuries are common among people all over the world.¹⁹

The occupations more commonly associated with eye injuries are auto-mechanics, blacksmiths, painters, electricians, plumbers, sand and rock blasting workers, farmers, engravers, construction workers, carpenters, metal workers as well as polishing and military personnel.²⁰ Other potential causes of eye injuries are assaults, anti-personnel land mine and harmful practices. The agents of ocular injuries may be blunt or sharp.²⁰

The ocular trauma classification group developed the ocular trauma score (OTS) which is used to predict the visual outcome of patients with open globe injury.²⁰ The ocular trauma score (OTS) ranges from 1 (most severe injury and worst prognosis at 6 months follow up) to 5 (least severe injury and best prognosis at 6 months). The worst eye injuries are those from shrapnel for which the use of combat eye protection helps to reduce both the incidence and severity significantly.¹⁶ Blanch et al however reported that ocular trauma score seems to predict outcome for scores of 1, 4 and 5 with less concordance for scores 2 and 3.²¹

Globally, there are approximately 1.6 million people blind from eye injuries, 2.3 million are bilaterally visually impaired and 19 million have unilateral visual loss.²² In Nigeria, many studies have been done on ocular injuries with reports of ocular morbidity.²³⁻²⁹ Eye trauma is a significant cause of unilateral blindness in the Caribbean in both adults and children.^{30,31,32} In Trinidad and Tobago, blunt ocular injury accounts for approximately a third of all referrals from Accident and Emergency Department to the Ophthalmology unit.³³

Alkaline injuries may be caused by house hold bleach or ammonia-containing products, fertilizer, cement (lime) and firework (magnesium hydroxide) while acid injuries may occur from battery acid, nail polish remover (acetic acid) or vinegar.³⁴ Thermal ocular trauma is the result of falling into fires, or being splashed with hot fluid like boiling water or porridge, cigarettes and

curling irons.³⁴ Farm related activities (both crop and livestock) are also potential risks for eye injuries.^{35,36,37} So ocular damage can result whenever there is violence to the eye by any agent.

MATERIALS AND METHODS

This is a retrospective hospital-based study carried out at the Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Awka, Nigeria after ethical approval was sought and granted by the Ethical Committee. The case notes of the new patients seen at the Eye Unit of the Hospital from July 2016 to June 2018 were examined. Those with eye injuries were further reviewed. Information on biodata (age, sex, occupation) and clinical data (which highlighted the offending object, type of injury, setting of the injury, presenting visual acuity, presenting time and visual acuity at the last follow up visit) were extracted and recorded on a standard proforma. The data were analyzed using the scientific calculator and presented as frequency tables and bar chart.

RESULTS

Of the 2,559 new patients, 156 (6.1%) had eye injuries. Four cases were bilateral giving a total of 160 injured eyes. Out of the 156 patients, 97 (62.2%) were males while 59 (37.8%) were females (M:F ratio 1.6 : 1). The age range was 6 months - 92 years, mean age 33.4 years. There was a bimodal age distribution of 24 years (6 patients) and 58 years.

The patients in the age range 21-30 had more ocular injuries 41 cases (26.3%), followed by 11-20 years age range 30 patients (19.2%) - tables 1 and 2.

Eyelid injuries accounted for 27 (17.3%) subjects. Closed globe injury was 119 (76.3%) which comprised ocular contusion 39 (25%) cases, cataract 16 (10.3%) people, corneal ulcer 14 (9.0%) individuals. Hyphema 13 (8.3%), sub conjunctival haemorrhage 11 (7.1%), secondary glaucoma 9 (5.8%), uveitis 8 (5.1%), vitreous haemorrhage 3 (1.9%) and chemical injuries (affecting the lids, cornea and conjunctiva) 6 (3.8%) were also identified. Open globe

injuries were 10

Table 1: Age and sex distribution of 156 patients.

Age years	Sex		Total	Percentage
	Male	Female		
= 10	6	4	10	6.4
11-20	19	11	30	19.2
21-30	25	16	41	26.3
31-40	15	7	22	14.1
41-50	13	7	20	12.8
51-60	10	7	17	10.9
61-70	7	6	13	8.3
= 71	2	1	3	1.9
Total	97	59	156	100

(6.4%) and consisted of 7 (4. 5%) penetrating injuries (4 were corneo-scleral while 3 were corneal). Ruptured globe and perforating injuries affected 2 (1.3%) patients and 1 (0.6%) individual respectively. Penetrating eye injury had better visual acuity than the perforating and ruptured globe but the latter presented with the worst visual acuity.

Table 2 : Type of eye injury, age and sex distribution.

Age/year	Eyelid	Closed globe	Open globe	Sex		Total	Percentage
				Male	Female		
= 10	1	7	2	6	4	10	6.4
11-20	6	21	3	19	11	30	19.2
21-30	9	32	-	25	16	41	26.3
31-40	6	16	-	15	7	22	14.1
41-50	4	15	1	13	7	20	12.8
51-60	-	15	2	10	7	17	10.9
61-70	1	10	2	7	6	13	8.3
= 71	-	3	-	2	1	3	1.9
Total	27	119	10	97	59	156	100

Fist trauma accounted for 45 (28.8%) of the cases followed by missiles 26 (16.7%). Sharp objects like knife, broken bottles, metals and nails were responsible for 13 (8.3%) injuries and many activities contributed to that. Household items like furniture, door handles and utensils inflicted 12 (2.6%) eye trauma. Grass and balls (foot ball and tennis) were responsible for 4 (2.6%) and 7 (4.5%) of the

injuries respectively (table 3).

Table 3: Agents leading to eye injury.

Agents	No	Percentage
Fist	45	28.8
Missile	26	16.7
Stick	21	13.5
Whip	16	10.3
Sharp object	13	8.3
Furniture	12	7.7
Ball	7	4.5
Chemical	6	3.8
Head	6	3.8
Grass	4	2.6
Total	156	100

Fight generated the highest number of ocular trauma in 39 (25.0%) patients, followed by playing which accounted for 22 (14.1%) cases while accidental or deliberate chemical injuries were responsible for the least number in 6 (3.8%) people (table 4).

Table 4: Activities leading to injury

Activities	No	Percentage
Fight	39	25.0
Play	22	14.1
Vocational work	19	12.2
Farming	18	11.5
Road traffic accident	17	10.9
Recreational activity	12	7.7
Home chore	12	7.7
Corporal punishment	11	7.1
Chemical	6	3.8
Total	156	100

Twenty-five patients (with unilateral ocular injury) did not attend follow up giving a default rate of 25 (16.0%) cases. The

presenting and outcome visual acuity are summarized in table 5.

Table 5: Visual acuity (V.A.) at presentation and last follow up visit.

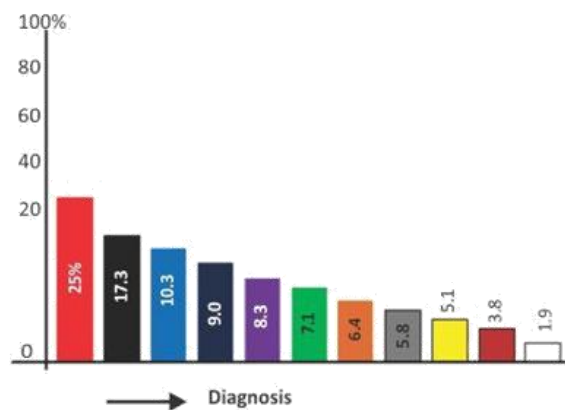
WHO Category -	Presenting visual acuity		Last following up	
	Injured eye (6/6 – 6/18)	Normal eye	Injured eye	Normal eye
Normal vision	72 (45%)	72 (47.43)	96 (71.1%)	
Impaired vision (< 6/18 – 3/60)	32 (203)	28 (18.48)	19 (14.1%)	
Blind (<3/60)	56 (35%)	52 (34.2%)	20 (14.8%)	
Total	160 (100%)	152 (100%)	135 (100%)	

Ocular contusion 39 (25%) was the highest occurring diagnosis followed by lid lesion 27 (17.3%) and cataract 16 (10.3%). Vitreous hemorrhage which accounted for 3 (1.9%) cases was the least common followed by chemical injury. Fifty-eight patients (37.2%) presented within 24 hours while 30 (19.2%) came 48 hours post injury. Of the 156 subjects under review, 114 (73.1%) presented within one week, 38 (24.4%) attended after one week but before one month. Three cases (1.9%) arrived at one month and one patient who had secondary glaucoma (0.6%) showed up 1-year after wounding - table 6 and fig. 1.

Table 6: Diagnosis, frequency and time of presentation.

Diagnosis	No	0 - 24hrs	24 - 48hrs	48 hrs - 1wk	2 wks - 3wks	1mth	Year
Ocular contusion	39(25.0)	11	9	12	7		
Eyelid injury	27(17.3)	11	3	3	10		
Cataract	16(10.3)	2	3	3	6	2	
Corneal ulcer	14(9.0)	4	2	1	6		
Hyphema	13(8.3)	6	3	1	3		
Sub conjunctival haemorrhage	11(7.1)	5	2	1	3		
Openglobe injury	10(6.4)	7	2		1		
Secondary glaucoma	9(5.8)	2	1	2	2	1	1
Uveitis	8(5.1)	2	4	2			
Chemical injury	6(3.8)	6					
Vitreous hemorrhage	3(1.9)	2	1				
Total	156 (100%)	58 (37.2%)	30 (19.2%)	26 (16.7%)	38 (24.4%)	3 (1.9%)	1 (0.6%)

Figure 1: Bar chart showing the diagnosis



Key:

- Ocular contusion – Red
- Lid injury – Black
- Cataract – Blue
- Corneal ulcer – Dark blue
- Hyphema -
- Sub conjunctival haemorrhage – Green
- Open globe injury – Orange
- Secondary Glaucoma – Ash
- Uveitis –
- Chemical injury – Dark red
- Vitreous Hemorrhage – White

DISCUSSION

Globally, eye injury is a major cause of ocular morbidity both unilaterally and bilaterally.²² The prevalence of ocular injury in this study was 6.1% and is similar to the findings of Addisu and Emem et al who reported the prevalence of 5% and 4.1% respectively from their hospital-based studies.^{38,39} On the other hand, Ezinne et al found a markedly higher prevalence of 17.7% from two eye clinics.²⁴ Unlike the latter, the present study and those of Addisu et al and Emem et al were single-centre studies which may have accounted for the disparity in incidence. Furthermore, Ezinne and her colleagues studied patients who were 21 years and above (the most active age group) whereas the present survey and those of Addisu and Emem analyzed eye injured subjects across all age groups.

The male (62.2%) to female (37.8%)

ratio in this study was 1.6 : 1. This male preponderance has been documented by other authors.^{24,38,40,41} Studies with much higher male to female ratios of 4:1 may have been as a result of religious and cultural factors.^{38,40,41}

In all cases, the greater proportion of ocular injuries in males is expected because men tend to perform more artisan tasks compared to females and these put the former at a greater risk for ocular trauma.²⁴ Many (45.5%) patients affected by eye injuries in our report were between 11-20 years and 21-30 years. This finding could be due to increased activities such as playing, violence and artisan jobs among this age group and this is consistent with the findings of other investigators elsewhere.^{23,24,38,40,42}

After the peak age range of 21-30 years in this study, there was a gradual decline of ocular injury with increasing age. The difference between sexes appears to disappear after the age of 70 years also and these findings reflect the observations by Addisu and Thylefors.^{38,41} This may not be surprising as there is decreased activity with increasing age. It may also be a reflection of the life style and occupational patterns with advancing age.

Closed globe injury was the most injury type seen in our review and is similar to the report by Omolase et al and Chakraborti and co.^{23,43} However, in other studies, Rafindadi et al and Okoye observed a preponderance of open globe injury.^{40,44} This discordance may be due to the large proportion of young people in the study by Rafindadi et al. Children are at a greater risk for ocular trauma because of immature motor skills, careless activities and inability to discern dangerous and harmful objects.⁴⁵ Okoye on the other hand focused on eye injured patients who were hospitalized. The possibility of open globe case being admitted into the hospital is higher in order to enable globe exploration and repair.

The commonest everyday agent of eye injury from our report was the human fist and is similar to the finding of Addisu.³⁸ Missile and stick were second and third causes of injury respectively from our survey. On the contrary, Addisu observed sharp objects as the second commonest cause of

ocular injury in their series. This difference may be related to the indigenous occupation in Awka city, which is notable for blacksmithing and metal work in contrast to the agricultural activities predominantly practiced by inhabitants of Butajira central Ethiopia where Addisu investigated.³⁸

Onyekwe in his report documented sticks (17.7%), missile (16.5%) and whip (14.4%) as the commonest agents of ocular trauma.⁴⁶ These were slightly higher than the findings in our study which may have been due to the fact that Onyekwe focused only on children in his account. Whip as an instrument for correction is most often used by the parents, teachers and security agents in our environment. It is increasingly becoming an agent of injury as was observed in this review. Interestingly, most literature on ocular injury elsewhere are silent on it particularly in environments where the use of whip on children is prohibited.

However, Onyekwe reported 14.7% cases of whip injuries which is higher than was found in our report. This is not surprising as children are more vulnerable to being whipped than adults.⁴⁶

Furniture (7.7%), weeds (2.6%), leisure (7.7%) and chemicals (3.8%) are also agents of ocular trauma in the present audit. Similar trends have been reported by other workers.^{23,25,41,46} Eye injuries from furniture are most often due to accident or domestic violence.²³

In Myanmar and Madagascar, a particular type of keratitis among rice harvesters has been reported and is rapid in progression with resultant blindness.⁴¹ From our study, thatch grass and the ubiquitous weed that resembles rice which are found on farm lands were responsible for 2.6% of ocular trauma. This highlights the vulnerability of the eye to grass injury.^{2,3,41}

Six (3.8%) cases of chemical burns seen in our report were by acid. Four of these were accidentally sustained when the victims were handling car batteries but two cases were intentional criminal attacks. Previous authors had reported eye injury from chemical assault as a crime of passion used to settle scores between aggrieved male and female lovers.^{2,3,31}

Leisure (recreational- or sport-) related ocular trauma was found in our survey. The injuries partly resulted from balls and bottle cork explosion on the eyes. Thylefors et al had reported sport was responsible for 3% of ocular trauma but was silent on other leisure activities.⁴¹ Other investigators also documented sports-related injuries as being responsible for cases of eye trauma. Omolase et al (0.8%), Megbelayin and colleagues (2.9%), Onyekwe (2.1%) and Flynn and co.^{23,25,46,47} They resulted in closed or open globe injuries but in all, low incidence were recorded. The activities leading to ocular injuries in our study were mostly as reported by other workers, although with varied frequencies.^{46,48} The difference in the rate of these activities could be due to the peculiarities of the population under review. While the present audit considered all ages, some other reports reviewed eye injuries among the paediatric age bracket only.^{46,49}

Fight 39 (25%) cases was observed to be the commonest activity leading to eye injury in our series and it is comparable with the observations of Megbelayin et al in Calabar (17.3%).²⁵ The harsh economic realities may have predisposed the victims to undue irritability thereby resorting to physical violence to settle disputes.

Work related activities as a cause of ocular injury had been observed by others especially among rural dwellers for whom farming is the primary occupation.^{38,50,51}

In our review, farming alone was the fourth commonest cause of eye injuries.

Road traffic accidents in our survey accounted for 17 (10.9%) cases of ocular trauma while

Rafindadi et al reported automobile crashes in 29 (20.4%) cases of eye injuries.⁴⁰ The poor quality of the roads and non-observance of speed limits may have accounted for the incidence of ocular trauma from automobile accidents in our environment. However, Onyekwe studying only children found road traffic accidents was responsible for 3 (3.1%) cases of eye trauma only, which are lower than the findings in our series. Children do not travel as much as adults which explains the discordance.⁴⁶

The most common diagnosis in our

study was ocular contusion in 39 (25%) cases which resulted mainly from blunt trauma. This finding is similar to that of Omolase et al, Ezinne et al and Addisu who also observed a preponderance of blunt trauma in their series.^{24,25,38} Fist being the commonest agent of injury in our audit accounted for the diagnostic finding of ocular contusion in the affected patients.

Omolase et al, Addisu and Onyekwe reported 37.9%, 23.5% and 28.5% incidence of hospital presentation within the first day of injury respectively.^{23,38,46} Although the attendance on the first day in our review is comparable to that of Omolase et al, late presentation is otherwise the norm. Such factors as financial constraints, self medical intervention and ignorance may have caused the delay in presentation. However, those who sustained open globe injury had 90% presentation within 48 hours. In general, the severer the injury, the earlier the hospital presentation.

In conclusion, ocular injury can be encountered in any activity man finds himself. The spectrum ranges from accidental injuries to deliberately inflicted trauma (including chemical assault and fighting). There is preponderance of males and younger age groups at risk of ocular injuries than the females and the elderly. Generally, there was delayed presentation at the hospital following ocular injury. However, the severe injuries had earlier presentation than others.

Conflicts of interest: None declared.

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