EPIDEMIOLOGY OF HOSPITALIZED OCULAR INJURIES IN THE UPPER EAST REGION OF GHANA

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SUMMARY

Aim of Study: The Upper East is the poorest and most rural region in Ghana and ocular injuries are a major public health problem. This study aims at providing epidemiologic data on the burden of this problem in order to facilitate the provision of integrated eye care and safety strategies for the prevention of such injuries in the region.

Design: A retrospective case series.

Methods: Computerized records of all eye injuries admitted to the clinic between January and December 2004 were retrieved and analyzed using the Epi-Info software. Injuries were classified using the Birmingham Eye Trauma Terminology while Snellen visual acuities were classified/banded using the WHO categories of visual impairments.

Results: Ninety six eyes of 96 patients were admitted over the study period. Seventy five percent of the patients were males and 82.3% below the age of 30 years. Half of the patients had to travel beyond 100 km to get ophthalmic assistance. Only one third of the cases reported within 24 hours while 21% reported after one week of their injuries. These delayed periods of reporting showed no statistically significant relationship with the distances travelled to the hospital (p=0.76; chi2 test), nor the eventual visual outcome achieved following treatment. Open-globe injuries were by far the most common (60/96) and were 4.7 times more likely (Chi squared test) to produce poor visual outcome (p=0.02 CL 1.75-12.63).

Conclusion: Current eye care strategies do not adequately address the issue of eye injuries in the region. There is the need to provide integrated approach by incorporating primary eye care strategies into the existing primary health care system.

Keywords: Ocular trauma, Snellen chart, open-globe injury, closed-globe injury

INTRODUCTION

Ocular trauma, especially open-globe forms, is the most common cause of monocular visual impairment and blindness worldwide, with significant socio-economic impact[1]. Although it affects all age groups, previous studies have indicated that young males are most affected with majority below the age of 30 years.[1] Incidence rates for hospitalized ocular injuries in the developed world range from 8 per 100,000 in Scotland[2] through 13 per 100,000 in the United States[3] to 33 per 100,000 in Papua New Guinea.[4] The situation is certainly worse in developing countries where the problem is compounded by general lack of access to preventive health care at all levels. Direct comparison with data from these large studies is, however, sometimes limited by the different methods of reporting and definitions used in these studies.

This study aimed at providing epidemiologic data on the current situation of serious ocular injuries in the Upper East region of Ghana, based on hospital records, in order to inform planning and provision of eye care and safety strategies for the prevention of such injuries in the region.

PATIENTS AND METHODS

This is a retrospective study involving a review of all cases of severe ocular injuries admitted between January and December 2004 to the Bawku hospital eye unit for management. Patients' information from a computerized records system at the clinic were retrieved and analyzed using the Epi Info 2002 (Revision 2, January 30 2003) software. Data on demography and details regarding time, place, type and cause of injury as well as investigations and treatment modalities were noted. Also noted were the initial clinical presentation, length of time between injury and reporting at the clinic and information on whether patients had any treatment at a general hospital or a primary health care facility prior to reporting. All patients, except children aged five years or younger, had their Snellen chart visual acuities recorded. We elected to analyze only visual acuities at discharge due to the very high drop-out rate after this time point.

The post-treatment visual acuities (at discharge) were categorized into good (6/6-6/18), borderline (6/24-6/60) and poor outcomes (<6/60) using the WHO Ex-

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pert Group's recommendations on Blindness Prevention Outcomes (Geneva February 1998).
Ocular injuries were classified using the Birmingham Eye Trauma Terminology (BETT) system. Box 1 below shows definitions used in the BETT.[5]

Box 1 Ocular Trauma Definitions

Lamellar laceration	Partial-thickness wound of eye wall
Laceration	Full thickness wound of eye wall caused by sharp object
Rupture	Full thickness wound of eye wall caused by blunt object
Penetration Injury	Eye wall laceration with no exit wound
Perforation Injury	Eye wall laceration with exit wound

Eyewall: the cornea and sclera; inner layers of choroid and retina excluded

RESULTS

A total of 941 patients with ocular injuries were seen at the Eye Unit over the study period. Out of this 96 (9.5%) were serious enough to be admitted for in-patient care. This constituted 6.2% of all admissions (n=1558) over the study period. Of the admitted cases, visual acuities of 10 could not be assessed because they were too young. Only 17.7% (n=17/96) of the cases were formally referred from a primary or secondary health care facility while the rest presented directly to the hospital on their own. Eighty one percent (81.0%) of patients had self-medicated with either traditional eye medication or used some topical eye drop of a sort. All cases were monocular with the right eye affected in 44.8% (and the left 55.2%).

Age and Sex Distribution of Cases

Seventy two (75%) of the patients were males and the remaining 24 (25%) females. Mean age was 18.4 years, (range 2 to 81 years, SD=14.9). Seventy nine (82.3%) were aged thirty years or younger with 52 (54.2%) classified as children (aged less than 16 years). Table 1 shows the age and sex distribution of the patients.

Table 1 Age and sex distribution of the cases

Age	Sex		Total (%)
	M	F	
1-10	25	10	35(36.5)
11-20	25	7	32(33.3)
21-30	11	1	12(12.5)
>30	11	6	17(17.7)
Total (%)	**72 (75)**	**24 (25)**	**96(100)**

Out of 86 whose visual acuities were recorded, 73.2% (63/86) were males and 26.8% (23/86) females. There was no statistically significant difference between these two groups with regards to post-treatment visual outcome (p-value 0.36, Chi-squared test).

Time of Presentation and Distance from Hospital

Majority of the patients came from the Northern (43.8%) and Upper East (38.5%) regions. The rest were from the Upper West region (4.2%), Brong Ahafo region (1.0%), Burkina Faso and Togo (13.5%). Among the cases from within Ghana, the estimated median distance travelled was 104 kilometers (Range 0-400km). Approximately fourteen percent (13.5%) were from the Bawku township and its immediate surroundings (between 0-20km); 35.4% had to travel between 21 and 100km while the remaining 51.0% travelled between 100 and 400km to seek ophthalmic assistance. Approximately fifty seven percent (57.3%) of the patients presented between 24 and 48 hours after injury while the rest came within one week or thereafter. These intervals between injury and presentation were not related to the distance needed to travel to get to the hospital (P-value=0.76, chi-squared test). Table 2 summarizes the periods of presentation and distances travelled to reach the eye care service facility.

Table 2: Relationship between distance travelled and periods of reporting

Reporting Period	Distance Travelled (km)			
	0-20	21-100	>100	Total (%)
Within 24 hours	4	12	16	**32** (33.3)
Within 48 hours	5	6	12	**23** (24.0)
Within 1 week	2	6	12	**20** (20.8)
After 1 week	2	10	9	**21** (21.9)
Total (%)	**13(13.5)**	**34(35.4)**	**49(51.0)**	**96(99.9)**

Cause and Mechanism of Injury

There were 60 open-globe and, 33 closed-globe injuries, and 3 injuries involving the adnexae (eyelids).

Fifty one percent (51.1%) of the injuries were caused by sharp and, 41.3% by blunt objects; the remaining 7.1% were indeterminate. Aetiologically, a wide range of objects were involved. These included twigs, pieces of wood and burst of sand and gravels among the farmers. Among the school children the above-listed objects were implicated in addition to injuries from sharp sticks, pencils, catapult and brawls. Cases of corporal punishment at school were responsible for 2 open-globe and 1 closed-globe injuries. In the other (older age) groups, fistic brawls, exploded gunpowder, flying pieces of metallic and wood objects at workshops etc.

were the main culprits. All the open-globe and six closed-globe injuries had primary surgical treatment. In 9 eyes with traumatic cataract, lens removal was deferred due to the state of the eye and technical difficulties.

Table 3 provides a summary of the types of injuries that were recorded. Amongst patients whose visual acuities were recorded open globe injuries were 4.7 times more likely to cause poor visual outcome than closed types of injury and this was considered statistically significant (P-value 0.02, 95% CI 1.75-12.63).

Table 3 Types of Injury

Type of injury	Numbers
Closed injury	**33**
Lamellar Laceration	11
Contusion	22
-Hyphaema	20
-Lens dislocation	1
-Vitreous haemorrhage	1
Open injury	**60**
Laceration	43
-Penetrating injury limited to cornea	6
-Penetrating cornea injury involving lens or uvea or both	5
-Penetrating corneo-scleral injury with or without lens involvement	28
-Intraocular foreign body (IOFB)	4
Globe Rupture	17
Adnexal Injury*	3
Total	**96**

*Eyelids

Occupation
One half (49.5%) of the patients were either school children or students at higher levels, 19.6% were farmers and 8.2% artisans. The remaining 22.7% belonged to a category made up of the unemployed, office workers, housewives, businessmen etc. All the injuries among the farmers and half of those amongst school children were sustained during farming activities.

Seasonality
The pattern of presentation revealed a form of bimodal distribution over the one year period. There was a rise in cases between March and May tapering off in June and a second increase in September to November, tapering off in December. These patterns are especially so for the farming and schooling occupational groups.

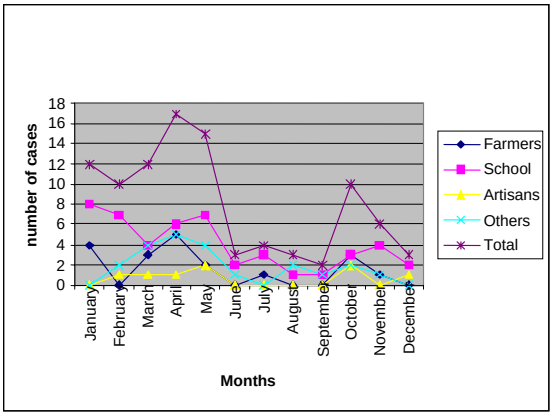

Figure 1 Pattern of ocular trauma presentations during different months

Visual Outcomes
Ten out of the ninety six patients were too young for their visual acuities to be taken. Of the remaining 86 patients, 77 (89.5%) had visual impairment (VA<6/18) at their initial assessment. Out of these 64 (74.4%) were considered blind (VA<3/60). Nine (10.5%) patients had their visions recorded as normal (6/6 to 6/18) at presentation. At discharge, the number of cases with visual impairment had fallen to 52 (69.3%) and blind cases to 38 (54.2%). Eighteen cases (20.9%) with ruptured globe or badly lacerated eyes were either eviscerated or enucleated.

Also eviscerated were globes which had developed panophthalmitis as a result of poor wound management in the immediate post-injury period. Five cases had traumatic cataract resulting from their injury but were deferred for secondary lens extraction with possible intraocular implant. The results are summarized in Table 4.

Table 4 Preoperative and postoperative visual status of the injured eyes

Visual Acuity	Initial		Final	
	Obs	%	Obs	%
6/6-6/18	9	10.5	35	40.7
<6/18-3/60	13	15.1	13	15.1
<3/60-NPL	64	74.4	38	54.2
Total	**86**	**100**	**86**	**100**

Evisceration=18

DISCUSSION

Ocular injuries are a common and largely a preventable cause of monocular visual impairment and blindness. Hospital-based studies show that 5% to 16% of all ophthalmic admissions to eye hospitals/units are related to ocular injuries[6]. The incidence of 6.2% found in our

study is consistent with these previous reports. The propensity towards young males and school-going children was consistent with those identified in this study. Our results of 75% males and 82.3% aged below 30 years respectively parallel the trends reported by other authors.[2,3,7,8] This pattern of distribution, with the majority of cases involving young and working groups, highlights the socio-economic burden of injury on our communities.

In most previous studies work-related injuries were reported to be the commonest cause of eye injuries in adults. This finding is supported by our study which shows that most of the injuries occurred during farming activities.[9,10] The aetiology of work-related injury, however, appears to be related to the level of socio-economic development of the setting. In most rural poor communities the main cause is farm-related whereas in more developed communities, it is more likely to be related to industrial activities.[8-11]

Many of the patients studied had to travel great distances to access eye care services in this part of the country. This probably accounts for why only a third of the patients presented within 24 hours (table 2). It probably also reflects why most of the patients had to improvise their own treatment by either buying over-the-counter eye drops or using traditional eye medication. Late presentation following ocular injury has been reported previously in a number of studies.[11-13] While our study failed to find any significant relationship between distance and time of reporting, studies by Qureshi (1997) reported that the further eye injury victims lived from an eyecare facility the earlier they presented following injury.[14] No reasons were however assigned for this finding in the report.

The bimodal pattern of seasonal distribution was unexpected, however. It appears to correlate with the farming (March- May) and harvesting seasons (September to November) in the northern parts of the country. This pattern which was demonstrated among both farmers and school-going children probably reflects the increasing use of children in farming activities in this region and some other areas in Ghana.

Visual outcomes in ocular injuries depend on the type of injury, the extent of damage and the presence or absence of secondary infections. Previous studies have reported that poor initial visual acuity, combined anterior and posterior segment injuries, lens dislocation, scleral wounds, intraocular foreign bodies and the presence of relative afferent pupillary defect are all associated with poor visual prognosis. On the other hand injuries caused by sharp objects have better prognosis than those caused by blunt objects.[2,15] In this study we elected not to undertake risk factor analysis as this is beyond the scope of this paper and will be covered more extensively in another article. What is clear, however, is that most of the 18 eyes that were evisceRated were not only badly damaged but were also infected; a situation partly attributable to the use of self medication and harmful traditional eye practices.

The standard practice in managing ocular injuries is to restore the structural and functional integrity of the eye to its pre-injury state as early as possible. This, of course, depends on the presence of the necessary human and technical resources. In our study all the open globe injuries had primary repair.

We acknowledge the weaknesses in not being able to evaluate visual acuities of children in the report and also the limitations in evaluating only visual acuities at discharge. These were due to the lack of the necessary expertise in assessing visual acuities of children and the poor review visitations.

At discharge 54.2% (52/97) of injured eyes were blind compared to 74.4% (64/97) on admission. The lack of improvement in some of the cases was due to our inability to manage some of the complications associated with eye injury. The lack of vitreo-retinal and corneal expertise, and equipment to manage some of these complications might have contributed adversely. The presence of cataracts which were not operated due to reasons afore-mentioned may have contributed significantly to the poor outcome seen at discharge. It is important to state, however, that the potential for visual improvement in these eyes with non-operated cataracts is high following subsequent surgery. In a case series by Chuang and Lai (2005), a statistically significant difference in visual improvement following secondary lens extraction with intraocular lens implant was reported[16]. In our setting, however, the problem is compounded by the low review visits by patients following discharge from the clinic. A previous study from our hospital reported that only 41% of cases operated for glaucoma actually came for follow-up by the 6th month while a similar study by Verrey et al in 1990 reported that only 19% of patients returned for monthly follow-up visits at 6 months.[17,18]

CONCLUSION

The high percentage of patients whose sight could not be restored reflects the complexity and magnitude of the problem. The current evidence shows that some population groups are at increased risk and that eyecare programmes may need to consider ocular trauma as a priority in these 'at-risk' groups. Teamwork and intersectoral collaboration with interest groups is needed to identify eye health needs, set goals, develop relevant

educational tools and encourage early referrals for appropriate treatment. It is about time we integrated primary eye care services into the existing primary health care programme in the region. Government could play its part by developing the relevant capacities at the facility level and implementing protective eye health policies. In this way we shall all be contributing our quota in reducing the number of preventable eye injuries that lead to monocular blindness and visual impairment.

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