Original Article

Pattern, Causes, and Management of Ocular Injuries at Rural Community Setting of Bangladesh

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Purpose: This study was undertaken to investigate the pattern, causes and management of ocular injuries in Bangladesh.

Study Design: Cross sectional study.

Place and Duration of Study: At Dr. Ahmadur Rahman research center, University of Chittagong, Bangladesh from August to December 2014.

Material and Methods: Ocular injured patients of community were invited through mass publicity to come to free clinic for check-up. They were interviewed by optometrist after the medical check-up. Two sets of data were collected; one from the hospital files and another from the community. A proforma was developed for collecting data from the hospital files on the basis of information available in the files of the patients. Similarly data was collected from the community patients.

Results: There were 425 patients from the hospital and 126 from the community. The vast majority of the injuries were open globe (91%) and the rest closed globe (9%). The most common type of injury was penetrating (81.4%), followed by lime burn (7%), ruptured globe (6.4%) and others (5%). The most common structural abnormalities were found in cornea (91%), conjunctiva (59%), iris and pupil (48%). Open globe injuries were as high as 91% for hospital patients as against only 18% for the community patients. Similarly closed globe Injuries were 82% among community patients as against 9% of hospital patients.

Conclusion: The nature of injuries found in hospital and community setting is different. Important ocular injury in community includes physical assault of married women by their husbands.

Key words: Ocular trauma, Visual Acuity, Blunt Injury, Community.

Ocular trauma is the second most common cause of unilateral, partial or total loss of vision after cataract in all age groups. The global pattern of eye injuries and their consequences suggest that about 55 million eye injuries are restricting activities of people for more than one day every year and 750,000 cases will require hospitalization each year including some 200,000 open globe injuries[1]. Ocular injuries occur at different places and by different agents. A significant percentage of ocular injuries occur at the residence of patients, which varies from 33% to 61% in different countries[1-8]. Another common source of injury is automobile accidents. In some countries, the percentage of occurrence of automobile accidents was found to be 55% or more of the total ocular injuries[9-17]. Significant percentage of ocular injuries occur among children during recreational activities[10] and among farmers during farm activities[18-22]. Many children receive injuries by kitchen knives, pen, pencil tips, stone, cable wires, scissors, thorn, crackers burst, gun pellet, stick and sharp objects[23-24]. One of the most frequently

occurring injuries in developing countries is blunt injury and intentional assault by husbands and familial feuds. Chemical, bird-beak and agricultural trauma are also found in limited numbers in developing countries[25]. We undertook this study to investigate the pattern, causes and management of ocular injuries in Bangladesh.

MATERIALS AND METHODS

Data was collected from two sources, one from the hospital records of patients with ocular injuries who received services from October 2012 to December 2013 at the hospital and the other from field survey along with eye examination in an ophthalmic clinic. The study was approved by the ethical review committee of Dr. Ahmadur Rahman Research center on August 7, 2014. A total of 425 patients with ocular injuries were selected from more than one thousand patient files in the hospital. Patients with ocular injuries in the community were invited through mass publicity to come to the free clinic for check up. Some of them came on their own while others were brought to the clinic at the cost of the researcher. They were also interviewed by optometrists after their initial medical check-up. Two sets of data collection instruments were developed. A proforma was developed for collecting data from the hospital files on the basis of information available in the files of the patients. Another proforma was developed for collecting data from the community patients, which included medical examinations and personal interviews. There were open and close ended questions in both data collection instruments. In addition to these data collection tools, some qualitative data was collected through informal group discussions and in-depth interviews. Interview questions were prepared for conducting informal group discussions and in-depth interviews. Discussions, however, were not limited to selected questions. Analysis of quantitative data remained limited to frequency distribution, measures of central tendency, and descriptive and inferential statistics.

RESULTS

Nearly two-thirds of the patients were 18 years or younger. It was observed that over 68% females patients were 10 years or below as against only 37% of males. The mean ages of male and female patients were 19 and 13 years, respectively but median ages were only 15 years for males and 6 years for females, which means a large number of patients were young and few were elderly. The most interesting fact was that only 35% of the total ocular injured patients were in active age group (Table 1).

Table 1: Percentage distribution of age of the injured patients by sex.

Age Categories[1]	Male n = 324		Female n = 101		Total n = 425
	Frequency	Percentage	Frequency	Percentage	Percentage
1 – 5 years	62	19.40	46	45.50	25.60
6 – 10 years	56	17.30	23	22.80	18.60
11 – 18 years	65	23.50	12	11.90	20.70
19 – 30 years	68	18.50	09	8.90	16.20
31 – 40 years	32	10.20	04	4.00	8.70
41 – 50 years	15	5.20	01	1.00	4.20
51 – 80 years	16	5.90	05	5.90	5.90
Total	324	100.0	101	100.0	100.0

[1]Ideally class interval is supposed to be done by some standard formula. **One of such formulas is $k= 1+3.322\log_{10}(n)$.** According to this formula the class interval should have been 9.22, {$1+3.322\log_{10}(425) = 9.22$} (Sturges, 1926), but because we required more precise information about the status of injured eye of children of different age groups (ending at 18 years), of active population, and of elderly people we purposively classified age to meet our study goals. This classification does not violate the principal of class interval as this is widely practiced in studies. In fact vast majority of statistics books do not even discuss about the principal of making class interval rather it leaves to the researchers' needs.

Mean	19.68		12.76	18.03
Median	15.0		6.0	13.0
St. deviation	15.88		15.91	16.14
x^2= 37.782; Cramer's V= .30, df = 6; Sig; P= < .001				

The difference of age of injured patients by sex was found statistically significant at .001 level (x^2 = 37.8, df = 6; Cramer's V = .30) (Table 1). The vast majority of the injuries were open globe (91%) and the rest closed globe (9%). The most common type of injury was penetrating (81.4%), followed by lime burn (7%), and ruptured globe (6.4%) and other (5%). Other injuries were traumatic hyphaema and chemical injury (except lime burn) (Table 2). The major instrument of injury was sharp objects (82%), which could be a knife, pencil, pen, stone throw, iron rod, etc. Only 12% of the patients with ocular trauma had normal vision, 30% had poor vision and 58% had vision close to blindness or completely blind. The structures of some of the ocular components were found normal ranging from 86% to 97%.

Abnormalities in the above mentioned components varied from 3% to 14%. The most abnormalities in the structure were found in cornea (91%), conjunctiva (59%), iris and pupil (48%). There was one common factor in each of these components and that was corneal penetration (81%) in cornea, congestion of conjunctiva (58%) and prolapsed tissue of iris (45%) causing irregular pupil.

As a matter of routine, all first reporting patients had to undergo injury assessment and visual acuity. Surgery was the main means of management (95.5%) because most of them came to the hospital with grave injuries. Pre-operative diagnosis at first reporting showed that about 87% were diagnosed with penetrating injury followed by ruptured globe injury (7%) and nearly 7% were diagnosed with the chemical injury and traumatic hyphaema. Attendance to follow-up services progressively declined. The first follow-up service was attended by 78% of the first reported patients while it was only 21% in the fourth. One of the reasons of fall in attendance could be progressive improvement in conditions of injured eyes, but there could also be other reasons. Among different follow-up attending patients, 50% to 65% had severe low vision or were blind. Range of good vision of patients (6/6 to 6/18) varied from 12.2% to 18.1% at first report through subsequent follow-ups. The majority of the follow-up attending patients had experienced an improvement. About 13% of the patients reported having either infection or inflammation in the injured eye in the first follow-up and that went down to zero at the fourth follow-up.

Table 2: Percentage Distribution of Types and Causes of Ocular Injury, and Preoperative Diagnosis for Surgeries of Patients.

Injury Types	**n = 425**	**Causes of Injury****	**n = 425**	**Preoperative Diagnosis**	**n = 406***
Penetrating Injury	81.40	Foreign Body	6.40	Penetrating Injury	86.5
Ruptured Globe Injury	7.30	Sharp Object/Instrument	81.60	Ruptured Globe Injury	8.40
Chemical Injury	1.40	Chemical Materials	0.90	Chemical Injury	2.20
Lime Burn Injury	7.10	Acid	0.50	Traumatic Hyphaema	3.00
Traumatic Hyphaema	2.80	Blow/Punch	1.90	--------	-------
-------	-----	Lime	7.30	--------	-------
-------	-----	Blunt Materials or Object	1.40	--------	-------
Total	100.0	Total	100.0	Total	100.0

Table 3: Percentage Distribution of Events Contributing to Ocular Injury.

Activities at the Time of Occurring the Injury	Male n = 65	x^2	P Value	Female n = 61	x^2	P value	Total n = 126
Playing	20.0	18.76	<.05	9.8	15.25	<.06	15.1
Recreation	12.3	16.54	<.05	13.1	17.58	<.05	12.7
Accident	3.1	18.78	<.001	6.5	17.88	<.001	4.0
Assault by Husband	-	-	-	19.7	19.90	<.001	10.3
Assault by Others	4.6	14.25	<.06	4.9	12.20	<.06	4.8
During farming Activities	16.5	17,33	<.03	4.9	10.45	<.09	11.1
During Non-farming Activities	33.8	11.55	<.09	18.0	15.50	<.05	26.2
During Household Chores	6.2	10.23	<.08	21.3	15.35	<.05	13.5
Other Activities	3.1	11.44	<.09	1.6	10.60	<.06	2.4
Total	100.0			100.0			100.0

Data collected from the rural community showed that only 21% of male patients were farmers. Among the non-farm occupational groups, most vulnerable one should have been wage laborers, but they were only 18% of the ocular injured patients, whereas service-holders and businessmen were 33% and 20%, respectively. This means at present it is difficult to identify a vulnerable group for ocular injury in the rural setting. We cannot compare background of patients of hospital and community patients because no data on occupation was recorded in hospital patients' files.

In response to a question, "How did you get injured", 25% of the patients reported that they got it while doing non-farm occupational activities followed by playing [2](15%), recreational activities (13%), household chores (14%), farming activities (11%), physical assault by husband (10%), assaulted by others (5%), accident (4%), and other reasons (2.4%) (Table 3). When we look into these data from the gender perspective we get a picture like this. About 20% male patients received injuries at the time of playing as against only 10% of the females. This could be for women's limited involvement with outdoor games or activities. It is a matter of grave concern that nearly 20% of the female patients had ocular injuries due to physical assault by their husbands (p value <.001). Ocular injuries during occupational activities skewed toward males compared to females[3] both for farm (male = 17%, female = 5%) and non-farm activities (male = 34%, female = 18%). Fewer women's occupational injuries could be for their smaller number and less hazardous occupational involvement. With regard to household chores the situation is just the reverse.

The normal vision was found among 46% of injured eyes as against 82% of fellow eyes. Unfortunately, 39% injured eyes had vision near blind or totally blind compared to none for fellow eyes. Hence injury to eyes seemed to have contributed significantly to monocular blindness or near blindness. The most affected components of the eye were cornea as 52% of the injured eyes were not found normal and 39% of them had Corneal Opacity. Except for cornea, all other components of eyes, such as orbit and periorbita, lid and lacrimal system, conjunctiva, iris and pupil, lens, retina and globe. Contour was found to be normal for 81% or more cases. About 20% of all injured eyes were normal and the rest 80% had some kind of abnormalities.

[2]This group of people was mostly young children.

[3]Women are primarily housewives but they are engaged in various non-agricultural and agricultural activities as a part of familial duties in addition to household chores.

Table 4: Percentage distribution of places from where first treatment was received.

First Treatment Received	Male n =65	Female n = 61	Total n = 126
Sought no Treatment	12.3	27.9	19.9
Traditional Healer/Quack	16.9	19.6	18.3
Registered Village Physician	9.2	-	4.8
Qualified Physician	4.6	3.3	4.0
General Hospital	18.5	18.0	18.3
Eye Specialist or Eye Hospital	33.8	26.3	30.2
Others	4.6	4.9	4.8
Total	100.0	100.0	100.0
x^2= 7.90, df=1, Cramer's V= 0.25 at P=<.01 level			

Fig. 1: Picture of an ocular injured woman assault by her husband.

One-third of the community patients did not receive treatment within 24 hours. They assigned the cause to financial constraint, the absence of escort, considered the injury not serious and no physician or service center nearby. Among the service recipient, women were fewer than men. Patients treated only with medicine were given antibiotic, atropine eye drop, systemic drugs, anti-glaucomatous drugs and NSAIDs eye drops.

About 78% of the victims encountered problems due to ocular injury. More women (81%) than men (68%) faced it. About 70% of the patients were satisfied with the treatment they had received. Those who were dissatisfied with the management assigned the cause to non-improvement of vision and wrong treatment.

DISCUSSION

There were two sets of data for the study. One collected from the patients' files of the hospital and another from the community after thorough examinations and interviews. Although both groups were ocular injured patients, they significantly differed in age structure. About 65% of hospital patients were children aged 18 or below while it was only 19% for the community patients. There is a gender disparity regarding incidences of ocular injury as 68% of girls of 10 years or below came to the hospital as against only 37% of boys of the same age. This means more girls at young age are involved with risky activities prone to ocular injury. The same result we have observed from Desai et al., 2015 study. They found that gender differences persisted with females more likely to have an injury from falls, or in the home and less likely to have one in the workplace[26]. Some differences were found between hospital and community data regarding types of injuries. In hospital most of the patients (81%) came with penetrating injury while only half of the hospital patients (41%) came to research clinic in the community. The reason behind this difference might be that the penetrating injuries are ocular emergency and most of the time patients have to go to the tertiary level hospital where the management of such ocular emergency is available all the time. Therefore, more patients' with penetrating injuries were found in hospital then community.

Another noticeable difference between hospital and community data is the presence of Ocular Surface Injury which was 9% among community patients as against none among hospital patients. The non-presence of this type of injury among hospital patients could be that injuries of this kind are manageable by simple medicine or heals naturally and thus there was

no need to go to the hospital. Blunt Injuries which ruptured the globe were present in both types of data and it was 6% among community patients and 7.3% among hospital patients.

Findings also revealed that the hospital cases were mostly Open Globe (91.0%), while community cases were mostly Close Globe (81.7%). The reason behind more patients' presence with Open Globe Injury in the hospital could be for children's predominance as patients who are hyperactive due to involvement with games and innovative activities. Contrary to it, Close Globe Injuries were found in community in greater numbers for which people do not go to the hospital as vision is less affected by close globe injuries. Sometimes they adjust with some abnormalities and discomfort with local treatment. Some studies support our findings and the range of Open Global injuries varies from 51% to 92%[5,11,13].

The sharp objects were the primary cause of ocular injuries among hospital patients (81%) and community patients (38%), which could be for their young age when the children are usually hyperactive. An opposite image was found for Blunt materials as a cause of ocular injury because it was as high as 48% among community patients as against 1.4% among hospital ones. The largest numbers of people of different ages receive eye injuries by sharp objects like kitchen knife, pen, pencil, tips, stone missiles, wood, glasses[4,5,9,10,13,20].

It may be due to the fact that Blunt Materials like punch, assault, ball etc. are not always dangerous enough to need ocular emergency treatment like those of penetrating injuries by sharp objects. This study has identified assault as a growing cause of ocular injury for women. About 20% of ocular injured women in the community were assaulted by their husbands and 5% by others. This problem has to be solved through informal education and empowerment of women in addition to medical services. Many women opined that they could not timely go to physicians due to the objection from their husbands and kin. Registered village physicians receive ocular injured patients and they prescribe drops and tablets for immediate relief of pain and swelling. Our ophthalmologist has found that they often prescribe tropical steroid eye drops which are extremely harmful for the ocular injured patients. However, the village physicians have requested for a one day workshop on how to deal with ocular injured patients. We believe this suggestion is worth consideration. Some community people until this test clinic held was less concerned about ocular injury as 17% of the patients never went to a physician possibly because it was not life threatening like other diseases. People seem to go by wait and see technique and do not consider its devastating effects in future. This notion can be changed only through health education that may be more appropriately done through school sight testing and community mobilization programs. Perceptions were measured through informal group discussion and few structured questions. However, despite some superstitious perceptions about eye sights all agree that modern treatment of ocular injuries are needed and service facilities should be made available.

CONCLUSION

The nature of injuries found in hospital and community setting is different. The Open Globe Injured patients are mostly children aged 18 years or below. Surgery was the main mode of management of hospital patients (95.5%) but in the community the main mode of management was medicine (62%). The most serious concern for ocular injured patients is that about 58% of the hospital patients and 41% of the community patients had monocular blindness. Hence, preventive measures along with high quality management should receive priority for reducing monocular blindness. A new fact about the ocular injury of community married women is husbands' physical assault. The assaulted women even can't seek treatment for the restriction of movement imposed by their husbands and kin.

Conflicts of Interest

No conflicts of interest.

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