



Original Research Article

Demographics and Pattern of Ocular Trauma during a Period of Civil Unrest

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ABSTRACT

Purpose: This study was undertaken to provide information on the clinical and the demographic data of patients admitted in the Ophthalmology unit of Government Medical College, Srinagar (Kashmir), India during a 5 month period, and to identify the cause and pattern of such injury.

Methods: This is a cross sectional study of all the patients who incurred ocular trauma and were admitted in the eye ward of Government Medical College, Srinagar between May and September 2010. The eye department serves as a major referral centre. 98 patients (105 eyes) who received different types of eye injuries were assessed and admitted in the hospital and managed accordingly. All patients were interviewed and underwent a detailed ocular examination. Injuries were classified according to BETT (The Birmingham Eye Trauma Terminology) and System for classifying ocular Injuries. Ocular Trauma Score (OTS) was calculated.

Results: 98 patients (105 eyes) were admitted after sustaining ocular trauma. Most of the patients (60%) were of age between 21-30 years. 89.79% of cases were males. Maximum number of patients (77.55%) reported in the hospital within 12 hours of injury. The place of injury was on streets in 76.53% of cases. The main cause of injury was due to stone pelting (28.57%) while pelting stones against the combat forces, followed by gunshot pellets (15.30%). The occupational and domestic injuries accounted for 23.46% of the total injuries. Closed globe injuries were more frequently seen (60.20%). Most of the open-globe injuries were due to pellets and stones of Type B and C, Grade D, Zone I and II with Relative Afferent Pupillary Defect (RAPD) in 21.73% of the cases. Closed-globe injuries were mostly of Type A, Grade A and D, and Zone I and II with RAPD in just 8.47% of patients. Ocular Trauma Score (OTS) of 3 was seen in considerable number of patients (56.19%).

Conclusion: Taking into consideration the violent protests and demonstrations across the valley of Kashmir (India) during few months of the study, the turmoil related injuries outnumbered occupational, sports, assault and domestic injuries. Since most of the turmoil associated injuries were visually significant, it becomes mandatory to educate the community and inform about the importance of preventive measures during violent activities. Ban on use of firearms by the police in controlling the protests and other safe alternatives to quell protestors should be encouraged.

Key words: Stones; pellets; Open globe injury; Closed globe injury; BETT (The Birmingham Eye Trauma Terminology); Ocular Trauma Score (OTS)

INTRODUCTION

The eyes are the third most common organs affected by injuries, next to the hands and feet, despite the fact that they represent only 0.27% of the total body area and 4% of the facial area. ⁽¹⁾ Most of the eye injuries have a direct relation with the specific occupation and the nature of activity at the time of injury. ^(2, 3) Risk factors of incurring ocular trauma are more in males. ⁽⁴⁾ This study was undertaken to provide information on the clinical and demographic data of patients admitted in the Ophthalmology unit of Government Medical College (GMC), Srinagar (Kashmir), India during a 5 month period, and to determine the cause and pattern of such injuries. During this 5 month period Kashmir witnessed violent protests against Indian armed and paramilitary forces. This information may help in the development of appropriate preventive measures. However, reform of the firearm laws is probably the best way of prevention.

MATERIALS AND METHODS

This prospective study was performed at the eye department of Government Medical College (GMC), Srinagar, India between May and September, 2010. The eye department serves as a major referral centre for emergency and specialized eye care in Srinagar and its surrounding smaller towns and villages. The study was registered with the institutional review board and was approved by the ethics committee of GMC, Srinagar (Kashmir).

98 patients (105 eyes) who received different types of eye injuries were assessed and admitted in the hospital and managed accordingly. Consent was taken from all the patients who were enrolled in this study. Patient data's were noted, which included parameters like age, sex, address, cause and place of injury, duration and activity at the time of injury. Other clinical data's obtained

were visual acuity at the time of admission, level of hyphema, and details based on the findings at slit lamp microscopy, intraocular pressure, direct and indirect ophthalmoscopy. Injuries were classified according to BETT (The Birmingham Eye Trauma Terminology) ⁽⁵⁾ and System for classifying ocular Injuries. ⁽⁶⁾ Ocular Trauma Score (OTS) ⁽⁷⁾ was calculated in order to estimate the information about visual expectations following the ocular injury.

RESULTS

During this study Kashmir witnessed a mass uprising in the form of protests against the armed and paramilitary forces. Stones, sticks, gun butts, marble sling shots, tear gases, rubber bullets and pellet guns were used to quell the protestors, leading to multiple ocular and other injuries.

98 patients (105 eyes) were admitted during the 5 month period. Number of male patients (88) admitted outnumbered female patients. 45 patients (45.91%) belonged to urban areas whereas 53 patients (54.08%) were from rural places. Maximum number of patients, 76 reported in the hospital within 12 hours of injury and the rest within 24 hours of injury. The right eye was involved in 48 (48.97%) subjects, the left eye in 43 (43.87%) patients and the injury was bilateral in 07 (7.14%) cases.

Table I: Age distribution

AGE GROUP(years)	No of patients	Percentage (%)
11-20	20	20.40
21-30	60	61.22
31-40	18	18.36
Total	98	100

Table II: Initial visual acuity

PRESENTING VISUAL ACUITY	No of eyes of patients	Percentage (%)
No light perception	09	8.57
Light perception to Hand motions vision	30	28.57
1/200-19/200	33	31.42
20/200-20-50	16	15.23
≥20/40	17	16.19
Total	105	100

Table I gives the age distribution of the patients admitted. Most of the cases, 60 patients (61.22%), were young adults (21-30 years) whereas 31-40 years age group formed 18.36% of the total admissions. Chart I clearly shows that the number of patients admitted was maximum in the month of September (33.67%) followed by July (23.46%) and minimum in May (9.1%). Chart II shows that the most number of patients admitted acquired injury on streets (76.53%) followed by home accidents (9.1%). Chart III and IV indicates that the majority of the injuries were caused by stones (28.57%) during stone pelting followed by occupational and domestic work related ocular injuries (23.46%).

Table II shows that the initial visual acuity was found to be between 1/200-19/200 in 33 eyes of patients (31.42%) followed by Light perception to Hand motion vision in 30 eyes of patients (28.57%). No light perception was seen in 09 eyes of patients (8.57%).

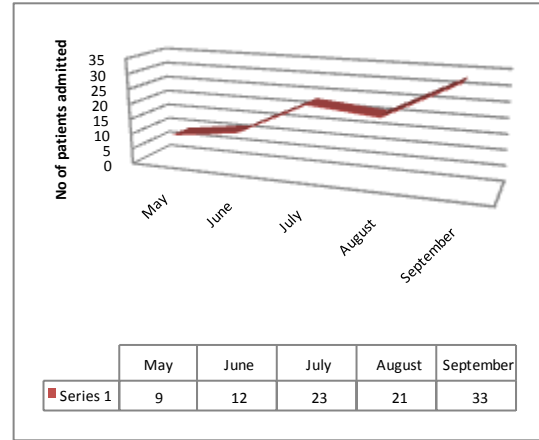


Chart I: Monthly admitted patients.

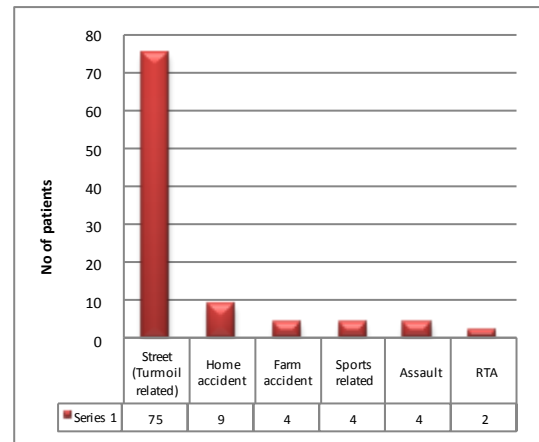


Chart II: Location where trauma was acquired.

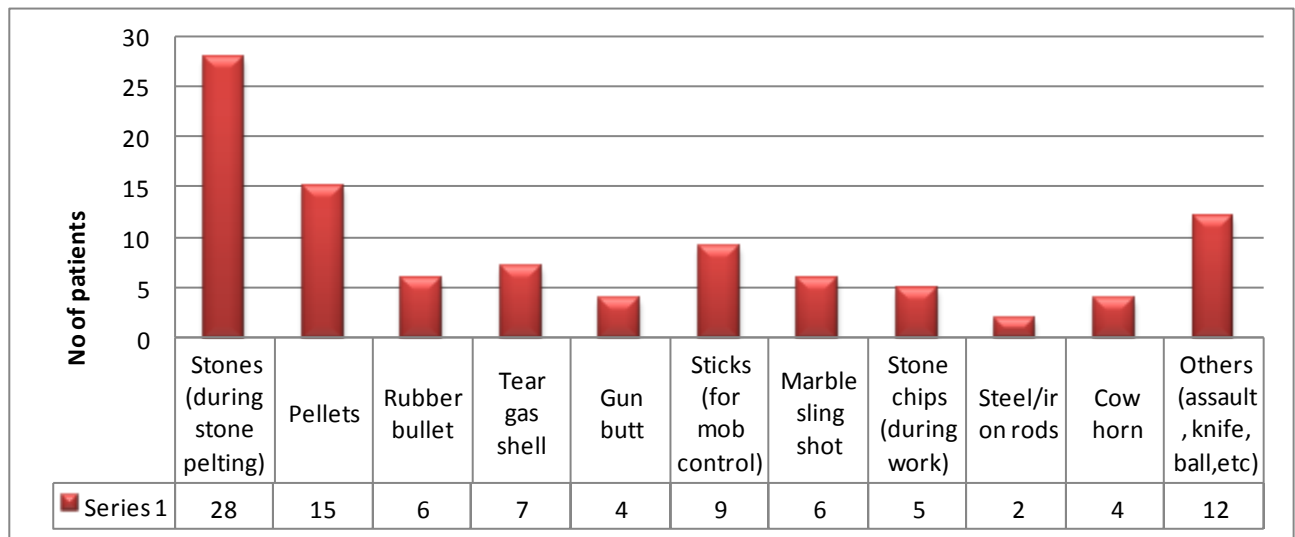


Chart III: Cause of trauma.

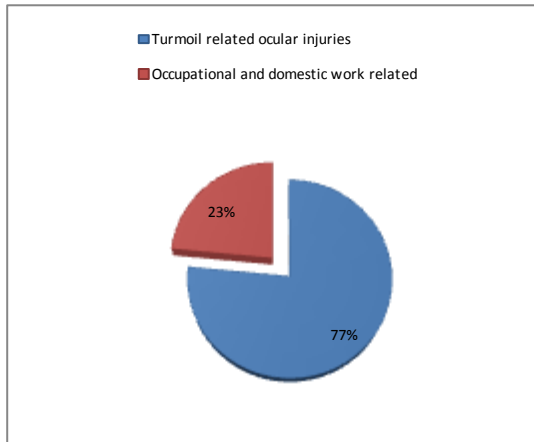


Chart IV: Cause of trauma grossly.

Table III [III (i), III (ii), III (iii) and III (iv)] describes the System for Classifying Ocular Injuries (both Open and Closed Globe injuries) in the patients admitted.

Table III (i) shows Open Globe injuries were caused mostly by pellets (41.30%) (Type C > Type D > Type B) followed by stones during stone pelting (21.73%) (Type B). Occupational and domestic work related open globe injuries amounted to 17.39% of eyes of patients.

Table III (i) also shows Closed Globe injuries were frequently caused by stones during stone pelting (30.50%) (Type A) followed by occupational and domestic work associated (25.42%) (Type A > Type D).

Table III (ii) indicates Open Globe injuries presented in Grade D (43.47%) > Grade C (30.43%) whereas Closed Globe injuries presented in Grade D (27.11%) followed by Grade A > Grade B > Grade C.

Table III (iii) shows RAPD positive in 10 (21.73%) and 05 (8.4%) eyes of the patients of Open and Closed Globe injuries respectively.

Table III (iv) illustrates Open Globe injuries are mostly located in Zone II (41.30%) followed by Zone I (36.95%) whereas Closed Globe injuries are frequently located in Zone I (50.84%) followed by Zone II (32.20%).

Table IV demonstrates Ocular Trauma Score (OTS). OTS of 3 is seen in 59 eyes of patients (56.19%) and OTS of 1 in 4 eyes of patients (3.80%).

Table III: System for Classifying Ocular Injuries (Open and Closed Globe)

Table III (i): Type (Mechanism of injury)

TYPE (Mechanism of injury)	STONES (STONE PELTING)	PELLETS	RUBBER BULLET	TEAR GAS SHELL	GUN BUTT	STICKS (MOB CONTROL)	MARBLE SLING SHOT	OCCUPATIONAL AND DOMESTIC WORK
OPEN GLOBE INJURIES								
A.RUPTURE	02	-	01	01	-	-	01	-
B.PENETRATING	07	04	01	01	-	-	02	05
C.INTRAOCULAR FOREIGN BODY	-	10	-	-	-	-	-	-
D.PERFORATING	-	05	-	-	-	-	-	01
E.COMBINED	01	-	01	-	-	-	01	02
Total (T1)	10	19	03	02	-	-	04	08
CLOSED GLOBE INJURIES								
A.CONTUSION	14	01	03	01	02	05	02	09
B.LAMELLAR LACERATION	02	-	-	-	-	02	-	02
C.SUPERFICIAL FOREIGN BODY	-	-	-	-	-	-	-	-
D.MIXED	02	-	-	06	02	02	-	04
Total (T2)	18	01	03	07	04	09	02	15
Grand Total T= (T1 +T2)	28	20	06	09	04	09	06	23
No of eyes involved = 82 (Turmoil related ocular injuries)							No of eyes involved (At work and others) = 23	

Table III (ii): Grade (Presenting visual acuity)

GRADE (Presenting visual acuity)	OPEN GLOBE INJURIES		CLOSED GLOBE INJURIES	
	No of eyes of patients	Percentage (%)	No of eyes of patients	Percentage (%)
A. \geq 20/40	02	4.34	15	25.42
B.20/50-20/100	02	4.34	14	23.72
C.19/100-5/200	14	30.43	13	22.03
D.4/200-Light Perception	20	43.47	16	27.11
E.No Light Perception	08	17.39	01	1.69
Total	46	100	59	100

Table III (iii): Pupil status

PUPIL (Relative Afferent Pupillary Defect,RAPD)	OPEN GLOBE INJURIES		CLOSED GLOBE INJURIES	
	No of eyes of patients	Percentage (%)	No of eyes of patients	Percentage (%)
A.Positive (RAPD Present)	10	21.73	05	8.47
B.Negative (RAPD Absent)	36	78.26	54	91.52
Total	46	100	59	100

Table III (iv): Zone (location of wound)

ZONE (Location of wound)	No of eyes of patients	Percentage (%)
OPEN GLOBE INJURIES		
I.Cornea	17	36.95
II.Limbus to 5mm posterior into sclera	19	41.30
III.Posterior to 5mm from limbus	10	21.73
Total	46	100
CLOSED GLOBE INJURIES		
I.External	30	50.84
II.Anterior Segment	19	32.20
III.Posterior Segment	10	16.94
Total	59	100

Table IV: Ocular Trauma Score (OTS)

OCULAR TRAUMA SCORE (OTS)	No of eyes of patients	Percentage (%)
1	04	3.80
2	09	8.57
3	59	56.19
4	16	15.23
5	17	16.19
Total	105	100

DISCUSSION

The study was conducted in the summer of 2010, from May to September. During this time (mid June to September) Kashmir witnessed a mass uprising and violent demonstrations against army and paramilitary forces. 98 patients (with 105 eyes) were admitted in the eye wards of our hospital. As reported by other studies (3,8-10) there was a preponderance of male subjects, though in our study the proportion of male cases was much higher than reported in the above studies. The dominance of ocular injuries in the male patients (89.79%) is

related to the mass participation of males in the protests and active involvement by virtue of stone pelting on the armed forces. Out of 10 female patients admitted, 7 were admitted in the month of May, when there was no uprising. The remaining numbers of females were injured accidentally during the clashes. Since uprising was spread to the whole Kashmir, both urban as well as rural people participated in the protests almost equally. 77.55% patients reported in the hospital within 12 hours of the injury, the remaining 22.44% reported within 24 hours of injury. This may be related to the fact that patients belonging to far flung areas couldn't reach hospital immediately as public transport and ambulances couldn't function properly due to the violent clashes. This is in contrast to the finding of Qureshi et al (11) and Babar et al; (12) where majority of the patients presented 24hours after eye injury. There was a slight predominance of injury to the right eye (48.97%) in this study. This finding is in accordance with the one reported by Mallika et al (13) and Charles et al (14) where around 46% patients had right eye involvement. The reason may be the fact that most people are right handed. Bilateral involvement of eyes was seen in 7.14% cases. The bilateral involvement is slightly more than as reported by Khan et al. (15)

As reported by other studies, ^(3,10) most of the patients belonged to young adult age group (48.97%). This can be related to the fact that participation of young adults in the protests was overwhelming and were likely to engage in the aggressive and violent activities like stone pelting. Higher number of admissions in the month of September (33.67%) is suggested by the fact that most of the pellet injury patients were admitted in the same month. Probably more strict measures were taken to control the protestors during the concluding month of the uprising.

Since people took to streets during the protests, the place of injury was on the streets in 76.53% patients followed by home accidents (9.1%). Our finding is highly in contrast to the study by Mallika et al ⁽¹³⁾ and Desai et al ⁽¹⁶⁾ who showed that home is the most frequent place of ocular injury. The cause of injury was predominantly due to stone pelting (28.57%) acquired while pelting stones on army and the paramilitary forces. This finding may be attributed to the fact that the population under study underwent a transition from guns to the stones as mark of protest and resistance. The culture of using stones as a weapon of resistance against the occupying forces dates from the Palestinians. ⁽¹⁷⁾ The other causes

of unrest related injuries were due to Pellets (15.30%), Sticks (9.18%) that were being used at times for mob control, Tear Gas shells (7.14%), Rubber bullets and marble sling shots with equal frequencies of 6.12%, gun butt (4%). All the cases that had bilateral eye injuries (7.14%) were due to pellets and tear gas shells. Though most of the countries don't use live and non live rounds and other weapons during the civil unrest but various countries do use them under some specific legislative guidelines, most important of them being that even at the safe distance they are not to be fired at the level of head. In our study all the cases had sustained injuries when shot above chest.

In our study, turmoil related injuries amounted to 77% of the total ocular injuries and the rest were due to stone chips (5.1%) at the time of work, cow horn (4%), iron/steel rods (2%) and others (12.2%) which included assault injuries, sports related injuries, injuries due to knife, toys. The very low occurrence of school and sports injuries suggests the frequent shut down of schools and playgrounds during the curfews and the active participation of the children and young adults in stone pelting on streets.



Figure 1: X-ray skull lateral view of a patient with multiple pellets.

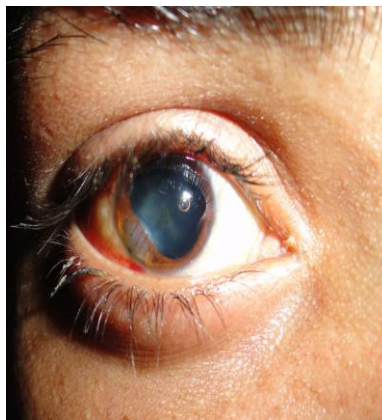


Figure 2: Patient with repaired Open globe Type B injury. Rosette cataract can also be seen.

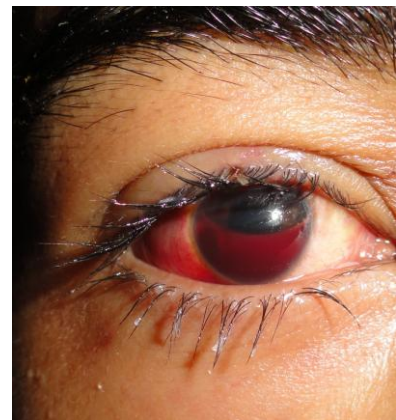


Figure 5: Closed globe Injury. Hyphema can be seen.

In our study frequency of the patients with Closed Globe injuries (56.19%) was more than Open Globe injuries (43.80%). Our analysis showed slightly higher incidence of Open Globe injuries as compared to the study by Karaman et al. (18) Open Globe injuries were mostly due to Pellets (41.30%) [Figure 1] and Stones, while pelting stones (21.73%) causing Type B [Figure 2, Figure 3], Type C and Type D [Figure 4] injuries mostly. 82.60% of Open Globe injuries were related to the turmoil. Presenting visual acuity was mostly in Grade D (43.47%). Grade E, No light perception was seen in 17.39% of the Open Globe injuries, thus indicating worse visual prognosis. Injuries were located posterior to cornea in 63.04% patients (Zone II and Zone III). Majority of the Closed Globe injuries [Figure 5] were due to Stones (stone pelting) (30.50%) followed by occupational and domestic work related (25.42%) causing Type A and Type D injuries mostly. 74.57% injuries were related to stone pelting directly or indirectly. Initial visual acuity was diffusely seen from Grade D to Grade A. Presenting visual acuity $\geq 20/40$ i.e. Grade A was seen in 25.42% cases. Most of the Closed Globe injuries belonged to Zone I (50.84%) and Zone II (32.20%).

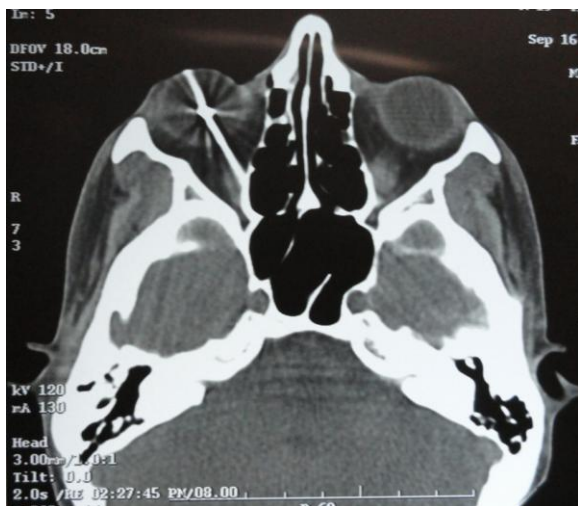


Figure 3: Axial CT scan of patient (Figure b) with Open Globe Type B injury.

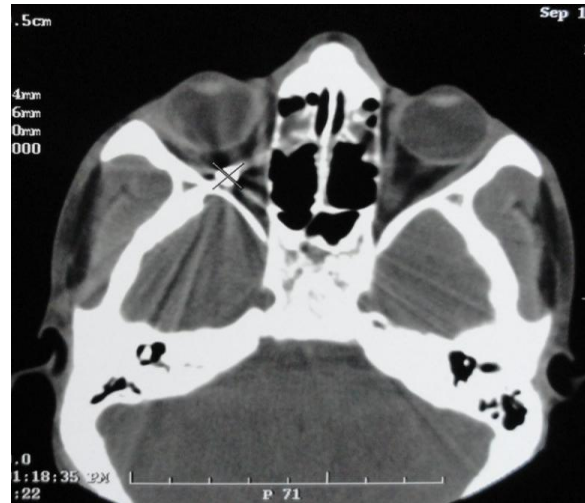


Figure 4: Axial CT scan of a patient with Open Globe Type D injury.

OTS (7) of 3 was seen in majority of the patients (56.19%) signifying that the final visual acuity of $\geq 20/40$ is possibly in 41% of the patients. OTS of 5 was noted in 16.19% eyes, indicating final visual acuity of $\geq 20/40$ in 94% subjects. 4 cases (3.80%) had OTS 1 meaning final visual acuity of $\geq 20/40$ in just 1% patients.

CONCLUSION

It is worrying that none of admitted patients utilized protective devices at the time of injury, despite being involved in a high risk activity.

Prevention of blunt eye injuries requires education of children and their care givers on the potential dangers of stone pelting. This study also signifies the need for educating people regarding the use of protective eyewear which may significantly decrease the magnitude of visual loss due to trauma.

Simple measures such as education, enforcement of legislation and campaign against the use of undemocratic means of controlling protests by police could reduce these severe ocular injuries in the communities affected. Even under dire circumstances, the use of the weapons should not be subjective at all and the rules

laid down in this respect should be duly honoured.

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