

## PATTERN OF OCULAR TRAUMA IN DISTRICT SWABI

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### ABSTRACT

**Background:** Ocular trauma is a significant proportion of emergency presentations. **Objectives:** This study was conducted to determine the pattern of ocular trauma presented in the ophthalmic casualty room of the secondary care hospital in District Swabi. **Subject and Methods:** This cross-sectional, descriptive study was conducted at the Eye Department of District Head Quarter Hospital, Swabi, over a period of two years; from 1<sup>st</sup> March, 2010 to 28<sup>th</sup> February, 2012. Five hundred and Six patients who presented with ocular trauma either through the outpatient or emergency department were included in the study. The patients demographic data, medical history, detailed examination and final diagnosis were recorded in a questionnaire. Statistical analysis were based on age, gender, presentation, ocular features and diagnosis. **Results:** Total of five hundred and six patients were included in the study. Male were 77.7% (n=393) and female were 22.3% (n=113). One hundred and forty five (28.7%) patients were workers while 17.8% (n=90) were housewife. Most of the patients (56.5%, n= 286) reported within few hours of trauma. Home (29.1%) and workplace (26.3%) was common place of injury. Mechanical trauma was observed in 80% (n= 405) of patients. Accidental trauma caused by wood (11.8%), assault due to finger/ fist (26%) and sports related trauma caused by ball (40%) was common. Presenting visual acuity was hand movement in 32% (n=162) patients. Both globe and extra globe injuries (44.5%), extra globe injuries (23.7%), globe injuries (23.3%) and complex injuries (8.5%) were noted. In globe injuries, open globe injuries (OGI) were 42.4%, corneal perforation was most common in 36% patients. Close globe injury was present in 28% patients, punctate keratitis observed in 29.5% patients. Eyelid was commonly injured (63%) in extra globe injuries. Full thickness laceration was found in 38.9% patients. **Conclusion:** Traumatic globe, adnexal and open globe injuries are the main ocular emergencies seen. Majority of ocular trauma is preventable. It can be assumed that health education, as well as application of safety measures and regulations, will significantly reduce the incidence of ocular injuries.

**Keywords:** Ocular emergency, trauma, globe injuries.

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### INTRODUCTION

Eyes represent 0.1% of the total body space and 0.27 % of the anterior body space but still their significance to individuals and society is disproportionately high.<sup>1</sup> Eye is the third most common organ affected by injuries after the hands and feet. The socio economic impact of ocular trauma can hardly be over estimated as those affected often have to face loss of career opportunities, major lifestyle changes and occasionally permanent physical disfigurement.<sup>2</sup> In addition to individual physical and psychological cost of ocular injuries, there is a direct and indirect financial cost to the society and environment because even minor ocular injuries can cause considerable morbidity and time loss

from work.<sup>3</sup>

Ocular trauma is a well known cause of blindness and visual impairment. Approximately half of the patients who present to an eye emergency department have ocular trauma.<sup>4</sup> Globally, it is estimated that 1.6 million cases of blindness and 2.3 million cases of impaired vision are caused by ocular trauma annually while about 19 million cases of monocular blindness and impaired vision are due to injuries.<sup>5</sup> In the United States alone over 2.4 million ocular injuries occur yearly with the eye trauma being the third most common ophthalmic indication for hospitalization.<sup>6</sup>

In developing countries like Pakistan, hospital based data revealed that 9.54% of total ophthalmic admissions are due to ocular trauma.<sup>7</sup> People are at different risks of eye injuries depending on factors such as their activity, jobs and protection methods they use. One study showed that 85 % of these patients are young i-e; less than 30 years old, in the most productive years of their life.<sup>8</sup> In the developing countries, eye injuries are not only more common but also more severe in nature. However, most ocular

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injuries and their complications can be prevented by appropriate safety precautions and early detection.<sup>9,10,11</sup>

Ninety percent of ocular injuries can be prevented using appropriate protective wear.<sup>12,13</sup> In our society despite high prevalence and serious consequences, ocular trauma is probably most unrecognized major health problem. Unfortunately there is no existing system of registration of ocular injuries. Determining the risk factors and gravity of the problem would provide the basis to develop strategies for the management and prevention of ocular injuries.

This study was carried out to determine the pattern of ocular trauma presented in the Ophthalmic Casualty Room of the secondary care Hospital in District Swabi.

## SUBJECTS AND METHODS

This cross-sectional descriptive study was conducted at the Eye Department of District Head Quarter Hospital, Swabi, over a period of two years; from 1<sup>st</sup> March, 2010 to 28<sup>th</sup> February, 2012.

**Inclusion Criteria:** All the patients of more than one year of age and both sexes having acute ocular trauma.

### Exclusion criteria:

- Infants and Neonates.
- Patients with non urgent ocular conditions like allergic eye disease, cataract, pterygium, refractive error and primary open angle glaucoma etc.
- Patients with ocular emergency like ocular infection including post traumatic and post operative infection, ocular inflammation, acute glaucoma etc.
- Patients who are unco-operative, severely injured, severely ill, unconscious, multiple organ injuries who are in life threatening situations.

All the consecutive patients presented to out-patient department or to emergency department of DHQ Hospital Swabi, were included in the study, after fulfilling the inclusion and exclusion criteria. An informed consent was obtained from patients or their parents in cases of children for using their data. Demographic information including age, sex, profession were taken. Detailed history about the patient's condition, eye involved, previous ocular trauma or surgery, cause of referral, activity

at the time of injury was recorded. Then patients were examined by standard procedures.

In case of trauma, in children mostly evaluation was done under general anaesthesia whenever feasible. If child was not prepared for general anaesthesia, patient was wrapped in cloth and examined with torch and direct ophthalmoscope after putting topical anaesthetic drops. In case of chemical burns (acid or alkali) thorough ocular wash was done urgently then patients were assessed for extent of damage. In case of mechanical trauma patients were assessed after emergency treatment and hemodynamic stability, either by torch or by slit lamp examination. In cases of suspected intraocular foreign body (IOFB) or orbital fracture, digital X-Ray orbit PA and lateral view was done at radiology department of DHQ Hospital Swabi. Then individual case was assessed for proper management and was dealt with accordingly.

The information gathered was then noted on a structured proforma. The information collected was entered into SPSS version 20 and analyzed. The data was presented as frequency distribution in the form of table or graph.

## RESULTS

This was a hospital based observational study. Total of nine hundred and sixty ocular patients attending the emergency patients department or Out Patient Department were noted in two years. Out of total ocular emergency patients, traumatic group comprising of five hundred and thirty six patients (55.8%) was further divided into traumatic non infectious and traumatic infectious sub groups. Traumatic non infectious sub group comprised of five hundred and six patients (94.4%) and traumatic infectious sub group comprised of thirty patients (5.6%) which were excluded from the study.

Out of five hundred and six patients, 273 (54%) patients were in the age range of 21- 40 years. Males were 77.7% (n=393) and females were 22.3% (n=113) out of total patients.

Regarding occupation, results showed that 28.7% (n=145) patients were workers, 17.8% (n= 90) housewives and 14.2% (n= 72) farmers. Occupation and sex distribution is shown in (Table I).

After trauma, 56.5% (n=286) patients arrived hospital casualty room within few hours, 30.0% (n=152) in less than one hour, 64 (12.6%) in less than one day and 4(0.8%) in more than one day. Time

since trauma and sex distribution is shown in (Table III). Overall, right eye was involved in 251 patients (49.6%), left eye in 204 patients and both eyes in 51 patients (10.1%).

Regarding the place of injury, most common place was home in 147 patients (29.1%), followed by Industry/ work place in 133 patients (26.3%) and street/ Highway in 103 patients (20.4%). (Table II).

Mechanical blunt injury was most common and was reported in 288 patients (56.9%), out of which 234 patients (81.7%) were male and 54 patients (18.3%) were female. Mechanical sharp injury was present in 117 (23%) patients, out of which 100 patients were male and 17 patients were female. (Table II). Most common cause of trauma was accidental, reported in 322 patients (63.6%). Violence/ Assault was second cause, reported in 169 patients (33.4%). Sports related injuries were present in 15 patients (3%). Large number of objects causing accidental trauma were identified. These included wooden stick (15.8%), wood (11.8%), iron rod (11.5%) and domestic activity (11.2%). Most common cause of violence/ assault trauma was fight in 26% patients, followed by road traffic accident in 24.9% patients, stick in 24.3% patients and stone throwing in 12.4% patients. (Table III)

Regarding sports related trauma, ball was most common object reported in 40% patients followed by gullidanda (20%), catapult, firecracker and toy pistol pallet in 13.3% patients each. Presenting visual acuity in traumatized eye was hand movement in 162 patients (32%), perception of light in 135 patients (26.7%) and finger count in 109 patients (21.5%). (Table VI).

Results of extent of injury showed that 44.5% (n=225) of trauma patients were having both globe and extraglobe injuries, followed by extra globe injuries in 23.7% (n=120) patients, globe injuries in 23.3% (n=118) patients and complex injury involving head & neck area in 8.5% (n=43) patients. Mechanical open globe injury comprised 42.4% (n=50) patients followed by close globe injury in 57.6% (n= 68) patients. Globe injury and gender distribution is shown in (Table V). Corneal perforation was most common open globe injury comprised of 36% (n=18) of patients of open globe injuries followed by corneoscleral perforation in 26% (n=13), limbal perforation in 20% (n=10) and sclera perforation in 18% (n=9)

patients. Results of close globe injury showed that punctate keratitis was most common presentation noted in 29.5% (n=20) patients followed by hyphema in 26.5% (n=18) and corneal foreign body in 21.9% (n=15) patients, iridodialysis in 8.8% (n=6), traumatic cataract in 7.4% (n=5), subluxated/ dislocated lens in 3 % (n=2) and vitreous haemorrhage in 3% (n=2). Regarding trauma involving both globe and extraglobe tissue, mechanical injury comprised 75.6% (n=170) patients followed by acid burns which was 10.2% (n=23) of patients. Globe perforation plus tissue laceration was present in 75.6% (n=170) patients followed by traumatic cataract plus tissue laceration in 10.2% (n=23), subluxated/ dislocated lens plus laceration in 7.6 % (n=17) and hyphema plus laceration in 6.7 % (n=15). In extra globe injury, eyelid was most commonly injured in 61.7% (n=74) patients. Mechanical trauma to eyelid was reported in 63.5% (n=47) of patients. Extra ocular tissue like brow and cheek injury was present in 25.8% (n=31) patients, out of which mechanical trauma was the most frequent type of trauma accounted for 51.6% (n= 16) patients.

Complex injuries involving eyes and head & neck area were reported in 8.5% (n=43) of total trauma patients. 46.5% (n=20) patients having complex trauma was due to mechanical injury, followed by acid burns in 20.9% (n=9) patients. Extraocular tissue damage was present in 76.7% (n= 388) of total trauma patients.

Extent of damage to traumatized tissue was also noted. Full thickness laceration was most frequent, reported in 38.9% (n=151) patients, followed by superficial laceration in 35.1% (n=136), burns in 14.9% (n=58) and contusion in 7% (n=27) patients.

**Table I: Occupation and sex distribution**

Occupation	Sex of patient		Total (%)
	Male	Female	
Pre school	5	1	6 (1.2%)
Student	51	12	63 (12.5%)
Housewife	0	90	90 (17.8%)
Worker	135	10	145 (28.7%)
Farmer	72	0	72 (14.2%)
Welder	42	0	42 (8.3%)
Driver	22	0	22 (4.3%)
Businessman	20	0	20 (4.0%)
Jobless	46	0	46 (9.1%)
<b>Total</b>	<b>393</b>	<b>113</b>	<b>506 (100.0%)</b>

Table II: Place and nature of injury and sex distribution

Place of injury	Sex of patient		Total (%)
	Male	Female	
Home	45	102	147 (29.1%)
Industry/ Work place	129	4	133 (26.3%)
Farm	48	0	48 (9.5%)
School	21	3	24 (4.7%)
Play ground	20	2	22 (4.3%)
Underconstruction building	29	0	29 (5.7%)
Street/ Highway	101	2	103 (20.4%)
<b>Total</b>	<b>393</b>	<b>113</b>	<b>506 (100%)</b>

  

Nature of injury	Sex of patient		Total (%)
	Male	Female	
Mechanical blunt	234	54	288 (56.9%)
Mechanical Sharp	100	17	117 (23.1%)
Thermal	15	11	26 (5.1%)
Acid	24	7	31 (6.1%)
Base	9	15	24 (4.7%)
Superglue	11	9	20 (4.0%)
<b>Total</b>	<b>393</b>	<b>113</b>	<b>506 (100%)</b>

Table III: Physical Objects causing injury and sex distribution

Cause	Objects	Sex of patient		Total
		Male	Female	
Accidental (322, 63.6%)	Wood	24	14	38
	Stick	37	14	51
	Knife	17	2	19
	Scissors	6	3	9
	Thorn	6	3	9
	Syringe needle	0	1	1
	Glass	12	2	14
	Animal bite	6	2	8
	Hammering on metal	14	0	14
	Welding	6	0	6
	Pressure Cooker blast	05	5	10
	Battery explosion	17	0	17
	Superglue	7	0	7
	Machine injury	30	2	32
	Iron rod	31	6	37
	Chemical splash	13	1	14
	Domestic activity	0	36	36
Assault (n= 169, 33.4%)	Stone throwing	17	4	21
	Finger/Fist	41	3	44
	Road traffic accident	39	3	42
	Bomb blast	4	0	4
	Firearm	14	2	16
Sports (n= 15, 3%)	Stick	32	9	41
	Catapult	2	0	2
	Gullidanda	2	1	3
	Firecracker	2	0	2
	Ball	6	0	6
Toy pistol pallet	2	0	2	

Table IV: Presenting visual acuity of traumatized eye and sex distribution.

Presenting visual acuity	Sex of patient		Total
	Male	Female	
No perception of light	8	2	10 (2.0%)
Perception of light	101	34	135 (26.7%)
Hand movement	132	30	162 (32.0%)
Counting finger	79	30	109 (21.5%)
1/60-6/60	29	15	44 (8.7%)
> 6/60	20	1	21 (4.2%)
Un co-operative	24	1	25 (4.9%)
<b>Total</b>	<b>393</b>	<b>113</b>	<b>506 (100%)</b>

Table V: Cause of Globe injury and sex distribution

Cause	Sex of patient		Total
	Male	Female	
Mechanical open globe	46	4	50
Corneal perforation	16	2	18
Scleral perforation	9	0	9
Corneoscleral perforation	12	1	13
Limbal perforation	9	1	10
Mechanical close globe	41	27	68
Hyphema	15	3	18
Iridodialysis	5	1	6
Traumatic cataract	4	1	5
Subluxated /dislocated lens	2	0	2
Vitreous haemorrhage	1	1	2
Corneal foreign body	9	6	15
Punctate keratitis	5	15	20
<b>Total</b>	<b>87</b>	<b>31</b>	<b>118 (100%)</b>

## DISCUSSION

In this study 77.7% (n=397) patients were male and 68% (n=267) of males were between 11-40 years. This is an agreement with Jahangir T et al,<sup>14</sup> who reported 80% of patients younger than 45 years, Iqbal A et al,<sup>13</sup> who reported 61.4 % male younger than 40 years and Jan S et al,<sup>15</sup> who reported 85% of males younger than 40 years. Poverty, illiteracy and lack of safety measures may all contribute to high incidence of trauma among males.

This study showed that trauma occurred most commonly in workers 28.7% (n=145) followed by house wives in 17.8% (n=90) patients. Home was the most common place for the trauma in 29.1% (n=147) patients followed by work place in 26.3 % (n=133) patients. These findings are consistent with Jahangir T et al,<sup>14</sup> who reported home in 31% and industry in 23 % patients. Desai et al,<sup>16</sup> also reported home in 30.2% patients, followed by industry in 19.6 % patients. In this study 14.2% (n=72) patients were farmer and 9.5% (n=48) were having farm related injuries. Jahangir T et al<sup>14</sup> also reported 26% farm related trauma. Although a vast majority of our population is involved in agriculture, the relatively low turnover of the patients is due to lack of

awareness and poor transport facility in rural areas.

In this study mechanical trauma was most common, present in 80 % patients (n=405) out of which 56.9% (n=288) patients were due to blunt objects and 23.1% (n=117) patients were due to sharp objects. This is in agreement with Malik RA et al,<sup>17</sup> who reported blunt trauma in 64.5% patients and sharp trauma in 38.5 % patients, Jafari AK et al,<sup>25</sup> who reported blunt trauma in 17.3% patients and sharp trauma in 11.4 % patients. Our findings were contrary to Jahangir T et al,<sup>14</sup> who reported sharp trauma in 32 % and blunt trauma in 27 % patients. Unawareness, traditional practices and medicines, religious beliefs, lack of education and health care, delay in seeking specialist treatment may be important contributory factors.

Accidental trauma was most prevalent in 63.6% patients and stick was most common object in 15.8% of patients. This is an agreement with Baber TF et al,<sup>18</sup> who reported accidental trauma in 47.2% and stick in 15.4 % patients as second common cause of accidental trauma. In our study accidental trauma was also due to wood, machine injury, knife, scissors, iron rod, glass, domestic activity etc.

Assault related injury comprised 33.4%, finger/first being most common cause in 26% of patients and RTA in 24.9% patients. Emam A et al,<sup>2</sup> reported assault in 62.2%, RTA in 20.5% patients. Babar TF et al,<sup>18</sup> also reported assault injuries in 31.2% cases. Stone throwing, bomb blast, firearm, stick and chemical flash were also reported as assault injuries. In one study, 17 % of ocular injuries were due to stone throwing.<sup>19</sup> Soylu et al,<sup>20</sup> reported ocular injuries due to stone throwing in 12%, firearm in 8%, bomb blast in 7.8% and metallic rod in 32.6% cases. Unemployment, social factors, illiteracy and poverty may be important contributory factors.

Sports related injuries comprised 3% of total injuries. Ball was most common in 40% patients, followed by gullidanda in 20%, catapult, firecracker and toy pistol pallet in 13.3% patients each. Babar TF et al,<sup>18</sup> reported sports related injuries in 13.5%, catapult in 36.9%, gullidanda in 15.3% and ball in 3.07% patients. Lack of safety measures, supervision and safe playing areas may be contributory.

Presenting VA was hand movement in 32% patients, perception of light in 26.7% and counting

figure in 21.5% patients. Jahangir T et al,<sup>14</sup> reported VA less than 6/60 in 79% of cases. Malik RA et al<sup>17</sup> reported 33.5% having VA as perception of light. Due to lack of safety measures, extent of trauma and its effects were severe in our setup.

Globe injury was present in 23.3% patients; mechanical open globe injury (OGI) was present in 42.4% patients. Corneal perforation was present in 26%, limbal perforation in 20% and scleral perforation in 18% patients. Malik RA et al,<sup>17</sup> reported 42% open globe injury, scleral perforation in 16% patients. Iqbal A et al,<sup>13</sup> reported OGI in 76.1% patients. Baber TF et al,<sup>18</sup> reported OGI in 50.9%, Ibadan study<sup>21</sup> reported OGI in 28.7%, corneal perforation in 65% patients. Hatton MP et al,<sup>22</sup> reported corneal perforation in 58%, corneo-scleral perforation in 29% and sclera perforation in 13% patients.

Mechanical close globe injury (CGI) was present in 28% patients. Malik RA et al,<sup>17</sup> reported CGI in 58% and hyphema in 38% patients. Babar TF et al,<sup>18</sup> reported CGI 37.3%, hyphema in 32.5%, punctate keratitis in 6.4% patients. El -Mekawey et al,<sup>23</sup> reported CGI in 16.3%, hyphema in 88.8%, corneal foreign body in 1.9% and punctate keratitis in 0.1% patients.

Thermal injury was reported in 5.1% of total patients, out of which 2.2% patients were female. Mostly thermal injuries were due to pressure cooker blast in 3.1% patients or due to domestic activities. Jafari AK et al,<sup>25</sup> also reported thermal injuries in 1.2% patients and all of them were male. Iqbal A et al<sup>13</sup> reported 3.5% chemical or thermal injuries. Fasih U et al,<sup>24</sup> reported 5.6% of thermal injuries. Unawareness, lack of safety measures at home may be important factors. Chemical injuries in 10.8% patients, out of which 56.3% was acid burns and 43.7% was alkali burns constituting 55.7% male and 44.3% female. Mostly the trauma was accidental due to battery explosion in male and domestic activity in female. Jafari AK et al,<sup>25</sup> reported chemical injury in 7.6% patients out of which acid burns were 15.4% and alkali burns were 10.7%. Jahangir T et al,<sup>14</sup> reported chemical injuries in 9% patients. These figures reflect that non-availability/non-usage of protective measures at work place or at home. These figures also reflect the vast opportunity for preventive measures to be introduced and public awareness increased.

Superglue injuries in 3.9% (n=20) patients, out of which 11 patients (55%) were male and 9 patients

(45%) were female. Mostly superglue injury was accidental. No serious ocular morbidity has been reported due to superglue injury. In the past 30 years, 53 cases of superglue injuries have been published in literature.<sup>26</sup>

Results of extent of damage to extra ocular traumatized tissue showed that 38.9% patients had full thickness laceration followed by superficial laceration in 35.1% patients, burns in 14.9% patients and orbital wall fracture in 4.1% patients. This showed that in our setup the ocular injuries were severe. Emam A<sup>2</sup> reported lid laceration in 38.6% patients and most of them were superficial laceration.

## CONCLUSION

Male gender, youth and unprotected eyes during high risk activities such as sports, fight and certain jobs like factory workers are at high risk for ocular injuries. Mechanical blunt ocular trauma is common with males more vulnerable. Traumatic globe & adnexal and open globe injuries are the main ocular emergencies seen. Majority of ocular trauma is preventable. It can be assumed that health education, as well as application of safety measures and regulations, will significantly reduce the incidence of ocular injuries.

## REFERENCES

1. Nordber E. Ocular injuries as a public health problem in sub-saharan Africa: Epidemiology and prospect for control. *East Afr Med J*. 2000; 77: 41-43.
2. Emem A, Uwemedimbuk E. Prevalence of traumatic ocular injuries in a teaching hospital in south south Nigeria a two year review. *Adv Trop Med Pub Health Int* 2012; 2(3): 102-108.
3. Johnston PB, Armstrong MF. Eye injuries in Northern Ireland two years after seat belt. *Br J Ophthalmol* 1986; 70: 460-2.
4. Chiapella AP, Rosenthal AR. One year in an eye casualty clinic. *Br J Ophthalmol*. 1985; 69: 865-70.
5. Negral AD. Magnitude of Eye Injuries worldwide. *J Comm Eye Health*. 1997; 10: 49-53.
6. Koo L, Kapadia MK, Singh RP, Sheridan R, Hatton MP. Gender differences in etiology and outcome of open globe injuries. *J Trauma*. 2005; 59: 175-8.
7. Jan S, Khan S, Mohammad S. Profile of ocular emergencies requiring admission. *Pak J Ophthalmol* 2002; 18: 72-6.
8. May DR, Kuhn FP, Morris RE, Witherspoon CD, Danis RP, Matthews GP, et al. The epidemiology of serious eye injuries from the United States eye injury registry. *Graefes Arch Clin Exp Ophthalmol* 2000; 238: 153-7.
9. Khan MD. Should ocular trauma be prioritized and treated as a major eye health problem in Pakistan? *Pak J Ophthalmol*. 2004; 20: 1-2.
10. Kuhn F, Morris R, Mester V, Witherspoon CD, Mann L, Maisiak R. Epidemiology and Socio-economics. *Ophthalmol Clin North Am*. 2002; 15: 1-5.
11. Chen G, Sinclair SA, Smith GA, et al. Hospitalized ocular injuries among persons with low socioeconomic status: a Medicaid enrollees based study. *Ophthalmic Epidemiol*. 2006; 13: 199-207.
12. Khan MD, Mohammad S, Islam ZU, Khattak MN. An 11 years review of ocular trauma in the North West Frontier Province of Pakistan. *Pak J Ophthalmol*. 1991; 7: 15-8.
13. Iqbal A, Jan S, Khan MN, Khan S, Muhammad S. Admitted Ocular emergencies: A four year review. *Pak J Ophthalmol*. 2007; 23(2): 58-64.
14. Jahangir T, Butt NH, Hamza U, Tayyab H, Jahangir S. Pattern of Presentation and Factors Leading to Ocular Trauma. *Pak J Ophthalmol*. 2011; 27(2): 96-102.
15. Jan S, Khan S, Khan MN, et al. Ocular emergencies. *JCPSP* 2004; 14: 33-36.
16. Desai P, MacEwen CJ, Baines P, et al. Epidemiology and implications of ocular trauma admitted to Hospital in Scotland. *J Epidemiol Comm Health*. 1996; 50: 436-41.
17. Malik RA, Rahil N, Hussain M, et al. Frequency And Visual Outcome Of Anterior Segment Involvement In Accidental Ocular Trauma In Children. *JPMI* 2011; 25(01): 44-8.
18. Baber TF, Jan S, Gul L, Khan MY, Zaman M, Khan MD. Pattern of pediatric ocular trauma in Hayatabad Medical Complex, Peshawar. *Pak J Med Res* 2006; 45: 6-9.
19. Thompson CG, Kumar N, Billson FA and Martin F. The etiology of perforating ocular injuries in children. *Br J ophthalmol* 2002; 86: 920-2.
20. Soylu M, Demircan N, Yalaz M, Isiguzel I. Etiology of pediatric perforating eye injuries in Southern Turkey. *Ophthalmic Epidemiol* 1998; 5: 7-12.
21. Baiyeroju Agbeja AM, Olurin Aina OI. Penetrating eye injuries in children in Ibadan. *Afr J Med Sci* 1998; 27: 13-5.
22. Hatton MP, Thakker MM, Ray S. Orbital and adnexal trauma associated with open globe injuries. *Ophthalmol Plast Reconstr Surg* 2002; 18: 458-61.
23. El Mekawey HE, El Einen KGA, Abdelmaboud M, Khafagy A, Eltahawy EM. Epidemiology of ocular emergencies in the Egyptian population: a five-year retrospective study. *Clin Ophthalmol* 2011; 5: 955-60.
24. Fasih U, Shaikh A, Fehmi MS. Occupational ocular trauma (causes, management and prevention). *Pak J Ophthalmol* 2004; 20: 65-73.
25. Jafari AK, Bozorgui S, Shahverdi N, Ameri A, Akbari MR, Salmasian H. Different causes of referral to ophthalmology emergency room. *J Emerg Trauma Shock* 2012; 5(1): 16-22.
26. Mclean CJ. Ocular superglue injury. *J Accid Emerg Med* 1997; 14(1): 40-41.