

Profile of ocular injury in pediatric age group

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儿童眼外伤概况分析

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摘要

目的: 研究北印度三级转诊中心儿童眼外伤的临床特征。

方法: 基于医院的流行病学研究。包括所有年满 16 岁的眼外伤儿童。记录关于患者的社会经济状况, 治疗手段和出院情况。随访 3mo, 记录初始和最终视力。眼部创伤分类指南和 Birmingham 眼部创伤术语用于眼外伤的定义和分类。社会经济地位是根据改良 B. G. Prasad 分类和 Kuppuswamy 社会经济级别分级的。

结果: 在 42 例儿童中, 男女比例为 3.6:1。发生在 11~16 岁儿童眼外伤最多 (50%)。大多数儿童 (59.52%) 属于较低的社会经济阶层, 且均为农村背景。在家中发生眼外伤的儿童为 20 例 (47.61%), 其次在学校, 游乐场和街道发生为 6 例 (14.28%)。其中开放性眼外伤 19 例 (45.24%), 闭合性眼外伤 23 例 (54.75%)。因木棍、石头、烟花、跌倒、玩具而受伤的儿童数量分别为 12 例 (28.57%), 5 例 (11.90%), 3 例 (7.14%), 3 例 (7.14%) 和 2 例 (4.76%)。17 例 (40.47%) 儿童需要药物治疗, 25 名 (59.53%) 需要手术治疗。

结论: 农村地区和经济条件较差的男童更易患眼外伤。儿童在家里更易患眼外伤。木棍和石头是引起眼外伤最常见的因素。开放性眼外伤的患病率更高且视力不良增多。需要进一步的以人群为基础研究以补充本研究。基于此, 人们可以计划在该地区实施一项长期的政策以预防儿童眼外伤。

关键词: 眼外伤; 开放性眼外伤; 闭合性眼外伤; 视力

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Abstract

• **AIM:** To study the clinical profile of ocular injuries in children in a tertiary care center in Northern India.

• **METHODS:** This was a hospital based descriptive study.

All children of ocular injuries up to 16y of age were included. Data regarding the socio-economic status, medical/surgical treatment, and condition at discharge were recorded. Follow-up to 3mo was done in the study. Initial and final visual acuity was recorded. Ocular Trauma Classification Group guidelines and Birmingham Eye Trauma Terminology were used for the definitions and classifications of ocular trauma. Socio-economic status grading is done according to modified B. G. Prasad classification and Kuppuswamy's socio-economic scale.

• **RESULTS:** Out of 42 children, male to female ratio was 3.6:1. Maximum number (50%) of injuries occurred between 11-16y of age. Most of the children (59.52%) belonged to lower socio-economic class and were from arural background. Ocular injuries occurred at home in 20 (47.61%) children followed by 6 (14.28%) each in school, playground, and street. Open globe injuries were seen in 19 (45.24%) children and 23 (54.75%) children had closed globe injuries. Injuries by wooden stick, stone, firework, fall, toy were 12 (28.57%), 5 (11.90%), 3 (7.14%), 3 (7.14%), and 2 (4.76%). Seventeen (40.47%) children required medical management and 25 (59.53%) were treated surgically.

• **CONCLUSION:** Male children in rural regions and of lower socio-economic background were more prone to ocular injuries. Children were more risk of ocular injuries at home. Wooden sticks and stone were the commonest cause of ocular injuries. Ocular morbidity and poor visual outcome were seen more in open globe injuries. Further population-based studies are required to reinforce findings of present study. Based on this, a long term strategy can be planned to prevent ocular injuries in children in this region.

• **KEYWORDS:** ocular injuries; open globe injuries; closed globe injuries; visual acuity

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INTRODUCTION

In children, ocular injuries are the commonest cause of acquired unioocular blindness. All over the world there are approximately 1.6 million people blind due to ocular injuries and around 2.3 million who are bilaterally visually impaired^[1]. Many children have poor visual acuity after ocular injury^[2]. Children at different age group have different mechanisms of injury^[3]. A clinical classification system for mechanical eye injuries was developed in 1997^[4]. Most of the ocular injuries

in children are preventable^[5]. There are only a few studies on ocular injuries in children in India and none from Uttarakhand state of India.

As different countries and different regions in a country have social and geographical variations, knowing the clinical profile of ocular injuries will help in understanding various aspects related to pediatric ocular trauma in this part of India. This understanding is important to make a long-term plan to prevent ocular injuries in this area. Therefore this study was done.

SUBJECTS AND METHODS

This hospital based descriptive study was done in the Department of Ophthalmology at a tertiary care center in Northern India, over a period of 12mo. Children with ocular injuries were taken up in the study after taking written and informed consent from parents/guardians. Children with ocular injury due to chemical agents were excluded from the study.

A questionnaire was used to study the variables such as age, sex, socio-demographic profile, nature of injury etc. Detailed examination including visual acuity was done. Anterior and posterior segment were evaluated. The extent of the injury and pupillary reaction were noted. X - ray, computerized tomography (CT), magnetic resonance imaging (MRI Scans) were done when required. Visual outcome was noted on the day of presentation to the hospital and up to 3mo follow-up.

Ocular Trauma Classification Group guidelines and Birmingham Eye Trauma Terminology were used for the definitions and classifications of ocular trauma^[6]. Socio-economic status grading was done according to modified B. G. Prasad classification and Kuppaswamy's socio-economic scale^[7].

Interpretation and analysis of the data thus obtained was carried out using SPSS version 19 (SPSS Inc. Chicago, Illinois USA), and Microsoft Excel. Parameters were interpreted by statistical test such as - Chi square and multivariate Friedman test taking *P* value of less than 0.5 as the level of significance. Approval of the ethical committee of institute was obtained and procedure followed was in accordance with the ethical standard of responsible committee on human experimentation.

RESULTS

A total of 42 eyes of 42 children were enrolled into the study in which 21 (50%) children were injured in the right eye and the same number of children were injured in the left eye.

Out of 42 children, 33 (78.57%) were males and 9 (21.43%) were females with a male: female ratio of 3.6:1. The mean age of males and females was 10.39 ± 3.84y and 7.61 ± 4.47y respectively. Thirty-three children (78.57%) were from the rural region where as 9 (21.43%) children were from the urban region. Ocular injuries were commonest in male children of 11-16y. A maximum number of ocular injuries (50%) occurred in the age group 11-16y (Table 1).

Nineteen children (45.24%) had open globe injuries and 23 (54.76%) children had closed globe injuries. There was a male preponderance in both the groups with a *P*-value 0.006 which was statistically significant (Table 2).

Table 1 Age and sex distribution n(%)

Age group (a)	Male	Female	Total
0-5	6 (18.18)	4 (44.45)	10 (23.90)
6-10	9 (27.28)	2 (22.22)	11 (26.10)
11-16	18 (54.54)	3 (33.33)	21 (50.00)
Total	33 (100)	9 (100)	42

Table 2 Sex distribution-injury wise n(%)

Type	Male	Female	Total
Open Globe	15 (45.45)	4 (44.44)	19 (45.24)
Closed Globe	18 (54.55)	5 (55.54)	23 (54.76)
Total	33 (100)	9 (100)	42

Table 3 Socio-economic status

Status	Rural	Urban	Total
Upper-I	0	0	0 (0.00%)
Upper middle-II	1	3	4 (9.54%)
Lower middle-III	2	5	7 (16.66%)
Upper Lower-IV	5	1	6 (14.28%)
Lower-V	25	0	25 (59.52%)

Maximum children belonged to lower socio-economic class and the correlation between the region of injury and their socio-economic status was found to be significant with *P* value of 0.0002. (Table 3).

Up to 5y of age, maximum ocular injuries occurred at home. After 5y of age more injuries occurred outdoors - *i. e.* in school, playground, streets, farms *etc.* and in 11-16y of age most of the injuries occurred outdoors (Table 4).

Most of the ocular injuries to female children occurred at home or school but male children got ocular injury at other outdoor places too. (Table 5).

A total number of children presenting to the hospital within 24h, 25-48h and more than 72h of injury were 23 (54.78%), 9 (21.97%) and 10 (23.25%) respectively. The majority of the children from the urban region (77.78%) presented within 24h of injury, whereas from the rural region only 48.49% children presented by that time.

Commonest mode of injury was wooden stick (12 children, 28.57%) and stone (5 children, 11.90%) (Table 6).

Perforating injuries were the commonest subtype in open globe group (9 children, 21.42%). In closed globe injury group, commonest subtype was contusion (13 children, 30.95%). (Table 7).

In open globe injuries, it was found that on the day of presentation 1 (5.37%) patient had visual acuity in between 6/60-2/60 and 16 (84.21%) patients had visual acuity of 1/60-PL where 2 (10.52%) patients were NPL. In closed globe injuries, 12 (52.17%) patients had visual acuity of better than 6/12, whereas 3 (13.06%), 1 (4.34%), and 7 (30.43%) patients had visual acuity of 6/18-6/36, 6/60-2/60, 1/60-PL respectively.

In this study, 17 (40.47%) children required medical management and 25 (59.53%) children were treated surgically (Table 8).

Table 4 Place of injury according to age group

Age group (a)	Home	School	Playground	Street	Farms	others	Total	n(%)
0-5	7(70)	2(20)	1(10)	0(0)	0(0)	0(0)	10	
6-10	6(54.55)	1(9.09)	2(18.18)	2(18.18)	0(0)	0(0)	11	
11-16	7(33.33)	3(14.28)	3(14.28)	4(19.11)	2(9.50)	2(9.50)	21	

Table 5 Place of injury-sex wise distribution

Place	Male	Female	Total	n(%)
Home	14 (42.43)	6 (66.67)	20 (47.64)	
School	4 (12.12)	2 (22.22)	6 (14.28)	
Playground	6 (18.18)	0 (0)	6 (14.28)	
Street	6 (18.18)	0 (0)	6 (14.28)	
Farm	1 (3.03)	1 (11.11)	2 (4.76)	
Other	2 (6.06)	0 (0)	2 (4.76)	
Total	33 (100)	9 (100)	42	

Table 6 Mode of injury

Cause	Male	Female	Total	n(%)
Ball	1 (3.03)	0 (0)	1 (2.30)	
Bow & arrow	2 (6.06)	0 (0)	2 (4.76)	
Fall	2 (6.06)	1 (11.11)	3 (7.14)	
Firework	2 (6.06)	1 (11.11)	3 (7.14)	
Knife	0 (0)	1(11.11)	1 (2.30)	
Pen	0 (0)	1(11.11)	1 (2.30)	
RTA	1 (3.03)	0 (0)	1 (2.30)	
Stone	5 (15.15)	0 (0)	5 (11.90)	
Toy	0 (0)	2 (22.22)	2 (4.76)	
Wooden stick	12 (36.36)	0 (0)	12 (28.57)	
Others	8 (24.25)	3 (33.34)	11 (26.53)	
Total	33	9	42	

Table 7 Type of injury

Type	Sub-type	Male	Female	Total	n(%)
Open Globe	Rupture	3(20)	0(0)	3 (7.14)	
	Penetrating	3(20)	2(50)	5 (11.90)	
	IOFB	1(6.66)	1(25)	2 (4.76)	
	Perforating	8(53.34)	1(25)	9 (21.42)	
	Total	15(100)	4(100)	19(45.24)	
Closed	Contusion	11(61.11)	2(40)	13(30.95)	
Globe	Lamellar	3(16.66)	0(0)	3(7.14)	
	Laceration				
	SFB	3(16.66)	3(60)	6 (14.28)	
	Mixed	1(5.57)	0(0)	1 (2.38)	
	Total	18(100)	5(100)	23(54.76)	

Table 8 Management

Management	Open globe	Closed globe	Total	n(%)
Medical	1 (5.20)	16 (69.56)	17 (40.47)	
Surgical	18 (94.80)	7 (30.44)	25 (59.53)	
Total	19 (100)	23 (100)	42	

The association between the type of injury and its management was found to be statistically significant with *P* value of 0.0002.

DISCUSSION

Ocular trauma in children is a common cause of visual loss. Children are relatively playful and vulnerable to injuries.

In the study majority of the children were males with Male: Female ratio of 3.6:1. It was also observed that most of the ocular injuries occurred in outdoor settings like a playground, street, farm *etc.* The present study was consistent with studies conducted by Al – Mahdi *et al*^[8] and Baber *et al*^[9] who reported the male to female ratio of 3.4:1 and 3.3:1 respectively. Cao *et al*^[10] also found a near similar male: female ratio of 3.3:1 in their study.

In the present study, the maximum number of ocular injuries (50%) occurred in the age group between 11-16y of age. Bharadwaj *et al*^[11] reported that the incidences of ocular injuries between 5-10y were 38.1% while ocular injuries in children between 10-15y were 6.6%.

In the present study, open globe injury occurred in 19 (45.24%) children and closed globe injury in 23 (54.76%) children. Closed globe injury was significantly higher than open globe injury in both the sexes with *P* ≤ 0.05. In the study conducted by Al – Mahdi *et al*^[8], open globe injuries occurred in 40.6% of the children and closed globe injuries occurred in 59.4% children.

The present study revealed that 33 (78.60%) children sustained injury in rural setup and 9 (21.40%) children in an urban setting. One of the contributing factors can be that maximum Indian population resides in the rural area. Maurya *et al*^[12] found that in 78.05% children ocular injuries occurred in rural or semi-urban areas.

In the present study, it was observed that maximum children were from the lower socio-economic group, in which 29(59.52%) children were from the lower class. Comparable results were seen by Shoja *et al*^[13] in which majority of children belonged to poor socio-economic class. Illiteracy and the ignorance towards health care in the lower socio-economic strata can be the cause of higher percentage of ocular injuries in their children.

In the present study, ocular injuries occurred at home in 20 (47.61%) children followed by 6 (14.28%) each in school, playground, and street. Pradhi *et al*^[14] also mentioned that 53% of ocular injuries at home, followed by street (16%) and street (9%)^[14]. Study conducted by Dulal *et al*^[15] Aghadoost *et al*^[16] and Mercaet *et al*^[17] also correlates with our study.

In this study, 23 (54.78%) children reported within 24h of the ocular injury, almost same percentage of the children reported after 24h of ocular injury. The difference between the region of children and their time of reporting to the hospital was found to be statistically insignificant with *P* – value of 0.293. Murithi *et al*^[18] observed that time of seeking medical care was on the same day in 34.6% children. Our institute is one of the easily accessible medical tertiary health care centers

located within the reach of the rural/urban population so a good number of cases could report within 24h of their injury. A similar presentation was also seen in a study conducted by El-Sebaity *et al*^[19].

In the present study, the commonest cause of ocular injuries was a wooden stick. A wooden stick was the cause of injury in 12 (28.57%) eyes, followed by stone (11.90%). These are the easily available resources used by the children in the rural setting for playing. Rohr *et al*^[20] also found that most common cause of injuries were woods and stone followed by glass pieces and falls^[20].

At the time of presentation, sixteen (84.21%) children with open globe injuries had visual acuity of 1/60-PL and 2 (10.52%) patients were NPL. In closed globe injuries, twelve (52.17%) children had visual acuity of better than 6/12 and 7 (30.43%) children had 1/60-PL. A study conducted by Maurya *et al*^[12] and Rohr *et al*^[20] also found that open globe injuries have poor visual prognosis as compare to closed globe injuries. Hence, children coming with open globe injuries had poor visual acuity at the time of presentation than the closed globe injuries. In this study, 17 (40.47%) children required medical management and 25 (59.53%) children were treated surgically. The association between type of injury and its management was found to be statistically significant with *P*-value of 0.0002. Since our institute is a tertiary care health center so a number of severe injuries requiring surgical intervention were referred to our hospital. Cao *et al*^[10] reported that 29.7% children were managed conservatively while 70.3% children required additional procedures, which correlates to our study^[10].

In the present study, eight children were lost in the follow-up in which 3 children were from open globe injury group and 5 children were from closed globe injury group. The final visual acuity of better than 6/12 was present in 4 (25%) eyes of open globe injury group and 14 (77.77%) eyes in closed globe injury group. This association between the type of injury and the visual outcome over time was found to be statically significant with *P* < 0.05. Hence, ocular morbidity was more in open globe injuries than the closed globe injuries. Cariello *et al*^[21] found that 69.6% children attained a visual acuity of 6/9 or better in closed globe injury group while 22.2% eyes in open globe injury had visual acuity of better than 6/9^[8]. Comparable results were also seen by Al-Mahdi *et al*^[8] Shoja *et al*^[13]. Thus, the severity of trauma is directly proportional to the morbidity and socioeconomic status which can be prevented by taking certain precautions^[22].

This study concludes that in this region of India, male children between 11-16y, children in rural regions and of lower socio-economic background is more prone to ocular injuries. Younger children have more risk of ocular injuries at home, while older children are injured outdoors more frequently. Wooden sticks and stone are the commonest cause of ocular injuries. Ocular morbidity and poor visual outcome were seen more in open globe injuries than closed globe injuries. This study will contribute to making people aware of the fact that pediatric ocular injuries are preventable by taking

simple measures. This is the first study on ocular injuries in children in Uttarakhand state of India. Further population-based studies are required to reinforce findings of present study. Based on this, a long term strategy can be planned to prevent ocular injuries in children in this region.

REFERENCES

- 1 Mustak H, Du toit N. ocular trauma. *S Afr Fam Pract* 2014;56(2):88-94
- 2 Banta JT. Epidemiology and economic impact of ocular trauma. *Ocular Trauma* 2007;1-5
- 3 Abbott J, Shah P. The epidemiology and etiology of pediatric ocular trauma. *Surv Ophthalmol* 2013;58(5):476-485
- 4 Banta JT. Definition and classification in ocular trauma. In: Banta JT. Ocular trauma; 1st ed. London; Elsevier publication 2007;46-47
- 5 Phogat J, Gagneja V, Sachdeva S, Rathi M. Evaluation of a Case of Penetrating Ocular Injury. *Indian journal of clinical practice* 2012; 22(12):28-30
- 6 Raja SC, Preramici DJ. Classification of ocular trauma. In: F. Kuhn, D. J. Pieramici (Eds.) Ocular Trauma; Principles and Practice. Thieme Medical Publishers, Inc., New York; 2002;6-8.
- 7 Holyachi S, Santosh A. Socioeconomic status scales - An update. *Annals of Community Health* 2013;1(1):24-26
- 8 Al-Mahdi HS, Bener A, Hashim SP. Clinical pattern of pediatric ocular trauma in fast developing country. *Int Emerg Nurs* 2011;19(4):186-191
- 9 Babar TF, Jan S, Gul L, Tariq M, Khan MY, Zaman M, Khan MD. Pattern of pediatric ocular trauma in Hayatabad Medical Complex. *Pak j Med Res* 2006;45(1):183-184.
- 10 Cao H, Li L, Zhang M, Li H. Epidemiology of pediatric ocular trauma in the Chaoshan Region, China, 2001-2010. *PLoS ONE* 2013;8(4):e60844
- 11 Bhardwaj A, Kramjit. Profile of Pediatric Ocular Trauma in Tertiary Care Centre in Amritsar: An Urgent Need To Review. *International journal of scientific research* 2015;4(9):531-532
- 12 Maurya R, Singh V, Yadav I, Singh M, Mishra C, Sen P, Kunwar A. Profile of Pediatric Ocular Trauma at A Tertiary Eye Care Centre in Northern India. *Indian Journal of Clinical and Experimental Ophthalmology* 2015;1(2):76-83
- 13 Shoja MR, Miratashi AM. Pediatric ocular trauma. *Acta Medica Iranica* 2006;44(2):127-130
- 14 Pardhi C, Nandedkar V, Shelke E, Bhojane V, Awatade V. Pattern of pediatric ocular trauma in rural area of Marathwada. *Journal of Clinical Ophthalmology and Research* 2015;3(3):127-131
- 15 Dulal S, Ale JB, Sapkota YD. Profile of pediatric ocular trauma in mid-western hilly region of Nepal. *Nepal J Ophthalmol* 2012;4(1):134-137
- 16 Aghadoost D, Fazel MR, Aghadoost HR. Pattern of pediatric ocular trauma in kashan. *Arch Trauma Res* 2012;1(1):35-37
- 17 Merca T, Valbuena M. Epidemiology and visual outcomes of pediatric ocular trauma cases in a tertiary hospital. *Philipp J Ophthalmol* 2014;39:27-32
- 18 Murithi I, Gichuhi S, Njuguna MW. Ocular injuries in children. *East Afr Med J* 2008;85(1):39-45
- 19 El-Sebaity DM, Soliman W, Soliman AM, Fathalla AM. Pediatric eye injuries in upper Egypt. *Clin Ophthalmol* 2011;5:1417-1423
- 20 Rohr JT, Santos PM, Santos RC, Vieira CV, Fé LM, Solano RL, Reis TF, Leão Mde O, Guimarães Vda C. Profile of pediatric eye trauma at Hospital de Base do Distrito Federal (HDBF), Brasília, Brazil. *Rev Assoc Med Bras* 2016;62(4):324-329
- 21 Cariello AJ, Moraes NS, Mitne S, Oita CS, Fontes BM, Melo LA Jr. Epidemiological findings of ocular trauma in childhood. *Arq Bras Oftalmol* 2007;70(2):271-275
- 22 Acar U, Tok OY, Acar DE, Burcu A, Ornek F. A new ocular trauma score in pediatric penetrating eye injuries. *Eye (Lond)* 2011;25(3):370-374