

Ocular injury pattern in the university hospital of South India

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Abstract

Background: Ocular trauma is a major cause of preventable monocular blindness and visual impairment in the world. There is relatively less population based data on the magnitude and risk factors for ocular trauma, especially from developing countries. In an attempt to determine the pattern of ocular injuries in the region, this study was carried out.

Methods: This retrospective study was conducted between April 2014 and March 2015 at the SRM MCH & RC, a suburban tertiary care hospital at SRM university campus. All available demographic data with ocular history and eye findings of the patients visiting the hospital during the study period were examined and recorded.

Results: Of 20,376 patients seen during the study period, 729 had at least one form of ocular trauma or the other. 82.44% were males while 17.56% were females. Mean age of the study group was $26.71 \pm SD 11.04$ years (range from 5yrs to 70 yrs.). The younger population between 11-40 years were most affected, of which 47.05% were from age group, 21-30yrs, as in TABLE 1. 45.54% of the trauma cases reported on the same day of injury, i.e. within 24 hours. In our study, 48.69% had visual acuity of 6/6 - 6/12. The most common cause of injury is work place related, 38.41%. Road traffic accident (RTA) 26.34% accounted second most common cause of the injuries followed by Sports 11.52% as in Table 4.

Conclusion: In this study, blunt eye injury was the most common type of ocular trauma. The community should be educated and informed about the importance of preventive measures.

Keywords: Closed globe injury, Open globe injury, Work place related, Road traffic accidents, Visual acuity, Preventative measures, Public awareness.

Introduction

Ocular trauma is a major cause of preventable monocular blindness and visual impairment in the world.^(1,2) Despite its public health importance, there is relatively less population based data on the magnitude and risk factors for ocular trauma, specially from developing countries.⁽³⁻⁷⁾

The socioeconomic impact of ocular trauma on an affected individual is that one often have to face loss of career opportunities, major lifestyle changes and occasionally permanent physical disfigurement.⁽¹⁾ In addition to physical and psychological cost of eye injuries to the individual, there is a direct and indirect financial loss to the society and the nation⁽²⁾ because even minor eye injuries can cause considerable morbidity and time loss from work.⁽³⁾ Ninety percent of ocular injuries can be prevented using appropriate protective wear.⁽¹⁾

Our SRM medical college hospital is situated on the national highway with different types of industries in the vicinity. Also the college is located in the campus of SRM University which caters to a large student population. Hence this study was taken up in an attempt to determine the pattern of ocular injury and its causes in this region.

Materials and Methods

This is a retrospective study of all the patients who reported directly with ocular injury or referred from the casualty to the eye department of SRM MCH & RC

between April 2014 and March 2015 on 729 patients with ocular injury. An approval of the institute's ethical committee was obtained for the purpose.

The records of all patients seen between this times were reviewed and those patients who presented to the eye department with eye injuries were included in the study.

The following data were taken from the patient's records, such as demographic details, duration of the trauma before reporting at the hospital, presenting visual acuity, place of injury, all ocular findings, examinations and imaging studies done. The inclusion criteria used in our study was interpreted as any injury to the eye and adnexa which led to an emergency ophthalmology referral or the patient themselves sought medical attention. World Health Organisation(WHO) and Birmingham eye trauma terminology system (BETTS) were used as operational definitions.⁽⁸⁾

All data were analyzed using statistical software package SPSS version 21.0. Variables of interest were summarized using descriptive statistics. For categorical variables, frequencies and percentages were used.

Results

A total of 20,376 patients were seen during the study period and of these 729 had at least one form of ocular trauma or the other. Of the study cohort, 82.44% (601 cases) were males while 17.56% (128cases) were females. Mean age of the study group was $26.71 \pm SD 11.04$ years (range from 5yrs to 70 yrs). The younger

population between 11- 40 years were most affected 30yrs, as in Table 1.
84.22 %, of which 47.05% were from age group 21-

Table 1: Age frequency of patients with traumatic ocular injury

Age (yrs)	Frequency (no. of patients)	%age	Males (no. of patients)	Females (number of patients)
1-10	39	5.35	34	5
11-20	150	20.58	123	27
21-30	343	47.05	287	56
31-40	121	16.60	103	18
41-50	49	6.72	36	13
51-60	10	1.37	7	3
>60	17	2.33	11	6
Total	729	100	601(82.44%)	128(17.56%)

Table 2: Visual Acuity at the time of presentation

Visual Acuity	Number of patients	%age
6/6-6/12	355	48.69
6/18-6/36	281	38.55
6/60-3/60	69	9.47
<3/60	24	3.29

Table 3: Time of presentation

Duration	Number of patients	%age
<24hrs	332	45.54
24-48hrs	259	35.53
48hrs-1 week	124	17.01
>1 week	14	1.92

Table 4: Cause of Injury

Cause of Injury	Number of patients	%age
Work place related : 176 cases -Iron dust /sand (Construction area) 12 cases-Accidental Fall (Construction area) 48 cases-Chemical 20 cases- Thermal 24 cases-Agriculture	280	38.41
RTA	192	26.34
Sports	84	11.52
Assault	75	10.29
Domestic	49	6.72
School	39	5.35
Fire cracker	10	1.37

RTA = Road traffic accident

Table 5: Pattern of Ocular Injuries

Types of Injury	No. of patients	%age
CLOSED globe:		
Contusion	176	24.14
Lamellar laceration	60	8.23

SCH	253	34.71
Corneal foreign body/abrasion	287	39.37
HypHEMA	68	9.33
Lens subluxation	3	0.41
Traumatic anterior uveitis ± Mydriasis	207	28.39
Vitreous Haemorrhage	34	4.66
Commotio Retinae	53	7.27
Traumatic Optic Neuritis	11	1.51
Rhegmatogenous Retinal detachment	5	0.69
OPEN globe:		
Penetrating ocular injury	23	3.15
Rupture	19	2.61
Fracture orbital wall	44	6.04

SCH = Subconjunctival haemorrhage

From Table 3, it's seen that 45.54% (332cases) of the trauma cases reported on the same day of injury, i.e. within 24 hours, while 35.53% (259cases) reported within 24-48hours of injury. In Table 4 we see that the most common cause of injury is work place related, 38.41% (280). Road traffic accident (RTA) 26.34% (192cases) accounted second most common cause of the injuries followed by sports 11.52% (84 cases), assault 10.29%(75cases), domestic 6.72%(49cases), school 5.35% (39cases) and fire cracker as 1.37%(10cases). Table 5 shows the pattern of ocular injuries, of these injuries, corneal foreign body/abrasion were most common 39.37% (287cases), followed by SCH, 34.71% (253cases) and traumatic anterior uveitis/mydriasis as 28.39% (207cases). Mostly injury cases represented as closed globe injuries, with less number of cases of open globe injury, Table 5. The patients of closed globe injury were managed mostly medically and surgically where needed with the combination of investigations involving X-ray imaging, computed tomography (CT) scan and B scan ultrasound where required while those of open globe injury had medical and surgical intervention with above investigations done as need based.

Discussion

Although ocular injury is an important cause of preventable loss of vision, until recently there has been a limited progress towards understanding the epidemiology and prevention of eye trauma, particularly in the developing countries.

There is a geographical variation in the cause of ocular injury which is age and gender specific.⁽⁹⁾ Studies from different regions such as the Caribbean,⁽¹⁰⁾ Singapore⁽¹¹⁾ and India^(12,13) demonstrate variations in the characteristics, incidence and prevalence of ocular trauma. These variations emphasize the influence of different methods of data collection, socioeconomic factors and industrialization of a population on the epidemiology of eye trauma.

In our study of the 20,376 patients seen in the eye department within the study period, 729 had one form of ocular trauma or the other giving a prevalence of 3.58%, the commonest cause being work place related and RTA. This is comparable to the prevalence of 4.06% as reported by Emem A et al⁽¹⁴⁾ study, the commonest cause there being assault and RTA.

There were more males, 82.44% (601 cases) affected than females 17.56% (128 cases) in our study. This is consistent with other studies i.e. of Sharmila N et al,⁽¹⁵⁾ 71% of them were males and 29% of them were females and Emem A. et al⁽¹⁴⁾ had 61.4% as males while 38.6% were females. Krishnaiah S et al,⁽¹²⁾ Nirmalan PK et al⁽¹³⁾ and Pinaki Sengupta et al⁽¹⁶⁾ reported similar trend. This is so probably because of the nature of work, as most men are involved in outdoor activity, travelling and the affiliation to sports, involving university students in our case as the hospital is located within the university campus. Similar trend has also been seen in developed countries as reported from the community based survey.⁽¹⁶⁾

Our study showed mean age to be $26.71 \pm SD$ 11.04 years (range from 5 yrs. to 70 yrs.) similar to Emem A et al⁽¹⁴⁾ study, where mean age of the study group was 29.9 ± 16.8 years. In the study of JC Nelson-Imoru et al,⁽⁹⁾ the mean age was 31.7 ± 15.1 years.

Further, in our study 45.54% (332 patients) reported within 24 hours of sustaining the injury, as in Table 3. This could be because of easy accessibility to the hospital as the region has well connecting roads and transportation. Also this reflects in terms of better visual acuity (VA) Table 2, which would have been facilitated by prompt first aid at work and early referral to the SRM MCH&RC or blunt injury secondary to sports, mostly from the SRM university campus. Jafari et al⁽¹⁷⁾ reported that 36.7% of the study cases reported within 24 hours and Omalase et al⁽¹⁸⁾ observed that 37.9% of the patients visited hospital within 24 hours. Sharmila N et al⁽¹⁵⁾ also noted that the majority of the patients reported to the hospital within 48 hours of injury. The above studies had comparable trend to our study.

Furthermore in our study, 48.69% had VA of 6/6 - 6/12. The study by Omolase et al⁽¹⁸⁾ represented 50.8% had a VA ranging from 6/6 - 6/18. While as per the study conducted by Iqbal et al⁽¹⁹⁾ from penetrating ocular trauma, 81.1% had a visual acuity $<3/60$ and 12.2% had a visual acuity 6/60-6/18. As our study had a lesser degree of penetrating injuries or open globe injury i.e most of them were closed globe injuries as in Table 5, so were in the study of Pinaki Sengupta et al⁽¹⁶⁾ and as such the patients presented to us with a better visual acuity. Secondly, the patients might have been referred to our hospital without delay. This might be the reason for a lesser damage to the ocular system and better VA at presentation. Also JC Nelson-Imoru et al⁽⁹⁾ showed similar study.

The above trend of early reporting in some cases or better VA might be due to their educational background also but in our study the literacy status of the patients were not mentioned in their case sheet. There has been varied reports on the effect of literacy to ocular trauma as from different studies of Khatry et al, Nirmalan et al and Vats S et al.⁽¹⁶⁾

Further, it was seen that the age groups most affected are those between 21-40 yrs, which being the most productive period, as 63.65% (464 cases) in our setting. This is consistent with other studies.^(7,9,18) A risky and adventure seeking behavior increases the chances of injury among younger men to eye injuries,⁽²⁰⁾ as also seen in the age group, Table 1 in our study. This seems to be common throughout the world, as evidenced by the predominance of males in younger age group reporting eye injuries in India, Mishra A et al & Titiyal GS et al⁽¹⁶⁾ as well as other countries in the developing and developed world,⁽¹⁶⁾ in our study also as seen in Table 1.

It was seen that in our study the commonest cause of injury was work place related 38.41% (280 cases) next was RTA at 26.34% (192 cases) followed by sports 11.52% (84 cases) as hospital located inside SRM University campus, Table 4. Of these injuries, the part of the eye most commonly involved in our study is corneal foreign body/abrasion 39.37% (287 cases), followed by SCH 34.71% (253 cases) others as in Table 5. Ajiboye⁽⁷⁾ reported that 31.3% of ocular injury resulted from RTA which is comparable to our study while Emem A et al⁽¹⁴⁾ reported RTA as 20.5%. In the study of Ajiboye et al⁽⁷⁾ the lids/conjunctiva (38.6%) was the most affected part of the eye. In Omalase et al⁽¹⁸⁾ study the cornea was the commonest site of injury as 43.9%. Whereas reports from Sharmila N et al,⁽¹⁵⁾ RTA was the commonest cause as 60% (180 cases) followed by assault 36% (108 cases), their study showed the most common pattern of injury was found to be SCH, 65% followed by lid trauma of 20%. While, in Jamaica, the highest incidence of ocular trauma occurred at home 47.5% (6.72% in our case) followed by the work place 25.0% and RTA as 13.8%.⁽⁹⁾ Krishnaiah S et al⁽¹²⁾ reported that the majority of the eye injuries occurred at

the workplace 55.9% and majority of those affected i.e. 97.8%, did not wear any eye protection at the time of trauma. Nirmalan PK et al⁽¹³⁾ also reported higher incidence of work place related ocular trauma. In the study done by Pinaki Sengupta et al,⁽¹⁶⁾ work place injuries were the commonest cause of injury 41.1% followed by RTA 11.2% assault 9.0% and the lowest number of reported cases was injuries sustained at the school 2.2%. While our study reported injuries in the paediatric age group involving school kids and at home as 5.35% (39 cases) and agrees with the literature that the majority of injuries in kids could be avoided with supervision.⁽⁹⁾ Injury due to firecracker accounted to be 1.37% of the total injuries and is comparable to the report of Arya SK et al of 1.6 - 2%.⁽²¹⁾

As can be seen from our study above and in Table 5, the parts of the eye involved and the common locations where the eye was affected owes to the location of our medical college & hospital on the national highway, suburb of Chennai and secondly owing to its location within the university campus. In our study, open globe injury was 5.76% (42 cases) comparable with 1.9–9.2% in other studies.⁽⁹⁾ Ocular trauma related to assault was 10.29% (75cases) in our study, being comparable to other studies which reported between 9.2% and 16.3% and was mostly associated with body parts and blunt objects as in other study.⁽⁹⁾ The reason for lesser open globe injuries reported in our study could be because of reporting of cases to places of emergency services delivered at other centre.

Therefore, awareness of the causes of ocular injuries and implementation of preventative measures can help the reduction of serious ocular trauma and further reduction on morbidity and mortality.⁽²⁰⁾ However, with one of the highest motorization growth rate in the world accompanied by rapid expansion in road network and urbanization over the years, our country is faced with serious impacts on road safety levels. About 54.1 per cent of all persons killed in road accidents are in the 15 – 34 years age group during the year 2015. Tamil Nadu has reported the highest number of road accidents⁽²²⁾ during the year 2015.

Students are involved in high thrill driving and riding bikes, therefore emphasizing the use of seat belts and helmets respectively must be advocated. Also, stricter enforcement of regulations will help decrease the incidence of severe ocular trauma in all age groups. Further, the use of seatbelts has been shown to prevent ocular injuries and reduce the risk of mortality.⁽²³⁾ In developed countries, legislation along with close surveillance via closed circuit systems encourages this practice as indicated in the study of Pace BW et al,⁽²³⁾ therefore similar trend need to be implemented everywhere when possible.

In places of work, there is need to highlight prevention strategies to increase public awareness and re-emphasize the use of protective eyewear within the high-risk groups in the population. Interpretations from

Dannenberg et al mentions that less than 10% of injured workers used adequate protective eyewear at the time of injur.⁽²⁴⁾ In order to motivate good practices among workers, stricter penalties for non-compliance should be enforced.

Finally, maintenance of trauma registries would help in storing essential public health information which can be analysed and the results used in planning and policy-making, ultimately reducing morbidity and mortality to an extent.⁽²⁵⁾ This would be helpful both for developing countries and also on an international scale with an international trauma databank ultimately allowing countries to have global benchmark data, with the aim of improving our trauma care systems and prevention policies.⁽²⁶⁾

Conclusion

Therefore in addition to general awareness, public education campaigns must be aimed at the groups at risk identified in this study as they form the majority of the working population and are directly related to the productivity and socio-economic growth of the region. A reduction in ocular trauma will reduce permanent visual impairment, leading to a significant reduction in the burden on the health services of the region and the nation on the whole.

Limitations

As this was a retrospective record based study only data entered in the register could be used. Detailed socio-demographic records not included in the study as it was not available at the institute records, therefore not included in the study. The long term outcome of the patients were not available as there was no active follow-up undertaken. Also the figures might under represent as some patients might have not reported SRM MCH &RC with minor eye injuries or other, i.e., could have attended other service provider in the area.

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