

Hospitalization Trends in Adult Ocular Trauma at the University Hospital of the West Indies

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ABSTRACT

Objective: To assess the epidemiology of ocular trauma in adult patients admitted to the University Hospital of the West Indies (UHWI), Jamaica, between January 2000 and December 2005.

Methods: Retrospective review of all adult patients admitted with ocular trauma in the UHWI trauma database.

Results: Three hundred and ninety-seven patients were admitted with ocular trauma during the study period; 35.8% of admissions with ocular trauma were ≤ 16 years of age. There were 252 adults (> 17 years old); 21.4% (54/252) were females and 78.6% (198/252) were males. The ratio of males to females was 3.7:1. The median age of the females and males was 32 years (95% CI 27, 35.9) and 33 years (95% CI 30, 35.0), respectively. The hospitalization period ranged from 1–283 days, mean 8.8 days in the males; and ranged from 1–39 days, mean six days in the females. March had the highest mean admissions over the six years. Severe chemical burns were the cause of the longest admissions. The most common place of injury was the home (30.2%) followed by in the street (28.2%); only 2% were from recreation. The most common cause of ocular injury was motor vehicle accident in 18.6%. The second most common cause was from nail hammering (14.3%); of this, 97.2% were male. Females (14.8%) were more commonly admitted from chemical injuries than males (11.1%). Of the females, 50% were due to domestic dispute and 50% were accidental bleach spills.

Conclusion: The most common cause of ocular injury was motor vehicle accidents, nail hammering in males and chemical injuries in females. Epidemiological information is important in determining the burden of ocular disease on the population. It is essential in planning improvement in health services and patient education for prevention of serious eye injuries.

Keywords: Adult ocular trauma, chemical burns, epidemiology, hospitalization, Jamaica, University Hospital of the West Indies

Tendencias de la Hospitalización por Trauma Ocular Adulto en el Hospital Universitario de West Indies

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RESUMEN

Objetivo: Evaluar la epidemiología del trauma ocular en pacientes adultos ingresados en el Hospital Universitario de West Indies (UHWI), Jamaica, entre enero de 2000 y diciembre de 2005.

Métodos: Se llevó a cabo una revisión retrospectiva de todos los pacientes adultos ingresados por trauma ocular en el HUWI, de acuerdo con la base de datos de dicho centro hospitalario.

Resultados: Trescientos noventa y siete pacientes fueron ingresados con trauma ocular en el periodo del estudio; 35.8% de los ingresos por trauma ocular tenían < 16 años de edad. Se trataba de 252 adultos (> 17 años de edad); 21.4% (54/252) eran hembras y 78.6% (198/252) eran varones. La proporción de varones con respecto a las hembras fue 3.7:1. La edad promedio de hembras y varones fue 32 años (95% CI 27, 35.9) y 33 años (95% CI 30, 35.0), respectivamente. El periodo de hospitalización osciló de 1 – 283 días, con una media de 8.8 días para los varones; y fluctuó de 1-39 días, con una media de 6 días, para las hembras. Marzo presentó el mayor promedio de ingresos

durante los seis años. Las quemaduras químicas severas constituyeron la causa de los ingresos de mayor estadía. El lugar más común de ocurrencia de las lesiones fue la casa (30.2%), seguido por la calle (28.2%); sólo 2% fueron lugares de recreación. La causa más común de lesión ocular fueron los accidentes motovehiculares en 18.6%. La segunda causa más común provino de martillar clavos (14.3%); de éstos, 97.2% fueron varones. Las hembras (14.8%) fueron más comúnmente ingresadas a causa de lesiones por sustancias químicas, en comparación con los varones (11.1%). De las hembras, 50% de los casos se debieron a disputas domésticas, y 50% a derramamientos accidentales de lejía.

Conclusión: La causa más común de la lesión ocular fueron los accidentes motovehiculares y el martilleo de clavos en los hombres, y las lesiones por sustancias químicas en las hembras. La información epidemiológica es importante a la hora de determinar la carga de las enfermedades oculares sobre la población. La misma es fundamental para planificar el mejoramiento de los servicios de salud y la educación de los pacientes en la prevención de lesiones oculares.

Palabras claves: Trauma ocular adulto, quemaduras químicas, epidemiología, hospitalización, Jamaica, Hospital Universitario de West Indies

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INTRODUCTION

Ocular trauma remains a preventable worldwide public health problem with significant socio-economic impact, with approximately two million eye injuries occurring annually in the United States of America (USA). The World Health Organization (WHO) programme for the prevention of blindness research indicated that there are ~ 55 million eye injuries/year that restrict activities for more than one day. Of these, 750 000 will require hospitalization (1). Ocular trauma is an important cause of unilateral blindness, resulting in about 19 million cases of monocular blindness (1, 2). The cumulative lifetime prevalence of an eye injury in the USA is estimated at 1400 per 100 000 population (3). Ocular trauma requiring hospitalization varies geographically from 4.9–57 per 100 000 (4–8).

SUBJECTS AND METHODS

This was a retrospective study to assess the epidemiology of adult ocular trauma admissions to the University Hospital of the West Indies (UHWI) between 2000 and 2005. The study was approved by the University Hospital of the West Indies/University of the West Indies/Faculty of Medical Sciences Ethics Committee. Confidentiality and anonymity were maintained. This study involved all adult patients with

ocular trauma registered in the Trauma Registry between January 2000 and December 2005.

The inclusion criteria included patients (≥ 17 years old) admitted to the hospital with ocular trauma, which also included patients who presented with other injuries. Data were collected on patient's age, gender, aetiology and place of trauma, hospital admission period and surgical intervention. Statistical analysis was done by Minitab version 14.1.

RESULTS

Three hundred and ninety-seven patients were admitted with ocular trauma from January 2000–December 2005. Of these, 145 were in the paediatric age (≤ 16 years) and 252 were adults. Of the 252 adults, 21.4% (54/252) were females and 78.6% (198/252) were males. The ratio of males to females was 3.7:1. The ages of the females were from 17–92 years and males from 17–89 years, with the mean age of 35.4 years in both groups (Table 1). Seventy-five per cent of the females were ≤ 44 years old, and 75% of males were ≤ 43 years.

The admissions rate ranged from 32–56 patients per year with a mean of 41/year (95% CI 32, 52) [Fig. 1]. The monthly admissions from ocular trauma ranged from 0–11

Table 1: Annual hospitalization and mean age according to gender

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Females (n) | 5 | 9 | 8 | 13 | 10 | 9 |
| Age range | 17–23 | 18–70 | 21–91 | 20–92 | 17–72 | 17–87 |
| Mean age | 20.2 | 33.2 | 41.4 | 44.2 | 34.8 | 38.5 |
| 95% (CI) | 15.2–25.3 | 22.0–44.4 | 22–60.1 | 30.3–58.2 | 22.9–46.7 | 23–54.1 |
| Males (n) | 30 | 46 | 24 | 32 | 24 | 41 |
| Age range | 17–62 | 17–67 | 19–66 | 18–89 | 21–60 | 18–71 |
| Mean age | 33.8 | 34.3 | 37.8 | 36.7 | 36.2 | 33.6 |
| 95% CI | 24.4–28.4 | 25.9–40.0 | 32.4–43.0 | 31.4–42.0 | 31.0–41.4 | 29.2–38.8 |

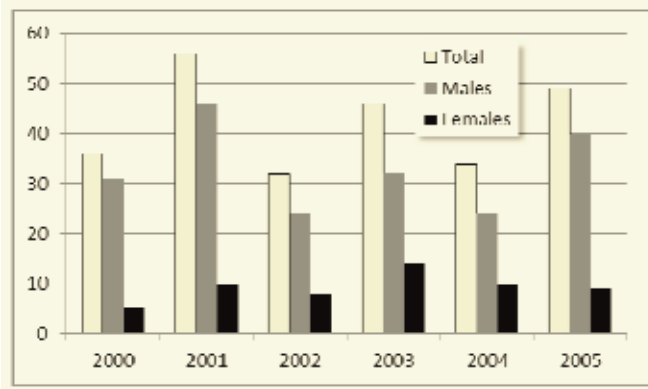


Fig 1: Admission trends according to gender for the period 2000-2005.

per month during the year (Fig. 2). March had the highest mean admission over the years. January, May, August and October were also months with higher admission rates whereas February and December were the months with the least number of admissions.

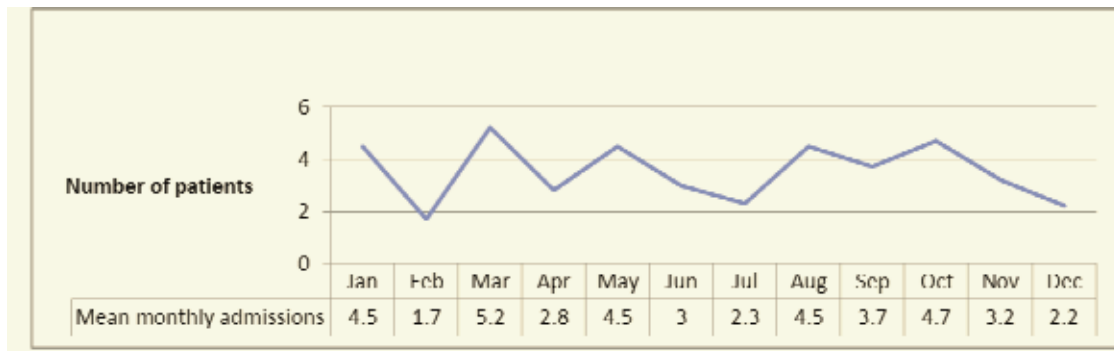


Fig 2: Mean adult monthly admissions with ocular trauma between 2000 and 2005.

Place of Injury

The home was the most common place for eye injury in the females [40.7%] (Table 2). Males were more likely to sustain

Table 2: Frequency of injury according to place in both genders

| Place of injury | Total | Adult Males (n = 198) | Adult Females (n = 54) |
|-----------------|------------|-----------------------|------------------------|
| Home | 76 (30.1%) | 54 (27.3%) | 22 (40.7%) |
| Street | 71 (28.2%) | 57 (28.8%) | 14 (25.9%) |
| Industry | 30 (11.9%) | 25 (12.6%) | 5 (9.3%) |
| Public building | 6 (2.4%) | 5 (2.5%) | 1 (1.9%) |
| Recreation | 5 (2.0%) | 5 (2.5%) | 0 (0%) |
| Unknown | 64 (25.4%) | 52 (26.3%) | 12 (22.2%) |

ocular trauma in the streets (28.8%) and home (27.3%). Industrial accidents caused injury in 12.6% of males compared to 9.3% of females. Females did not sustain any trauma from recreational activities compared to 2.5% of

males. The place of injury was not elucidated in 26.3% and 22.2% of cases for the males and females.

The most common cause of ocular injury was motor vehicle accidents [18.6%] (Table 3). Seventy-eight per cent of these patients were male. The nail during hammering activity was the second most common cause, occurring in 14.3% of all patients; 97.2% were males.

Chemical burns were the third common cause of injury (11.9%); 14.8% of females sustained chemical injury. Of these, 50% were due to a domestic dispute and 50% were accidental bleach spills. In the males, 36.4% (8/22) of cases occurred during domestic dispute; 13.6% (3/22) of cases in the males were due to car battery explosions and 13.6% (3/22) were due to wet cement (Table 3). Gun-related injury and stone throwing were the cause for ocular morbidity in 3.2% of cases, however, 87.5% of patients were male in both aetiologies. The female who received injury from the gun was gun butted and not shot.

Females (9.2%) were more likely to sustain thermal injuries than males (1.5%). Thermal ocular injuries in fe-

Table 3: Aetiology of injury according to gender

| Object | Total (n = 252) | Males (n = 198) | Females (n = 54) |
|---------------|-----------------|-----------------|------------------|
| MVA | 47 (18.6%) | 37 (18.6%) | 10 (18.5%) |
| Nail | 36 (14.3%) | 35 (17.7%) | 1 (1.8%) |
| Chemical | 30 (11.9%) | 22 (11.1%) | 8 (14.8%) |
| Wood | 17 (6.7%) | 14 (7.0%) | 3 (5.5%) |
| Fist | 17 (6.7%) | 11 (5.5%) | 6 (11.1%) |
| Bottle | 12 (4.8%) | 11 (5.5%) | 1 (1.8%) |
| Wire | 14 (5.5%) | 11 (5.5%) | 3 (5.5%) |
| Knife | 12 (4.8%) | 10 (5%) | 2 (3.7%) |
| Gun | 8 (3.2%) | 7 (3.5%) | 1 (1.8%) |
| Stone | 8 (3.2%) | 7 (3.5%) | 1 (1.8%) |
| Fall | 9 (3.6%) | 5 (2.5%) | 4 (7.4%) |
| Concrete chip | 4 (1.6%) | 4 (2.0%) | 0 (0%) |
| Ball | 3 (1.2%) | 3 (1.5%) | 0 (0%) |
| Thermal burn | 8 (3.2%) | 3 (1.5%) | 5 (9.2%) |
| Miscellaneous | 27 (10.7%) | 18 (9.1%) | 9 (7.7%) |

MVA = Motor vehicle accident

males occurred due to exploding microwaved eggs, curling iron and hot mortar; whereas in males they were secondary to a bush fire and being doused with gasoline and set ablaze.

Hospitalization for ocular trauma ranged from 1–39 days (mean six days) in the females (Table 4). The female

involved in an assault. Whereas 55% (11/20) of the males sustained head injury in addition to ocular injury from a motor vehicle accident, 30% (6/20) received blunt trauma and 10% (2/20) had gunshot wound injury. One of the males that had an associated head injury had fallen from a tree.

Table 4: Hospitalization period according to gender

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|--------------------------------------|-----------------|-------------------|------------------|--------------------|-------------------|--------------------|
| Females (n) | 5 | 9 | 8 | 13 | 10 | 9 |
| Hospitalization period (days) | 2–12 | 1–13 | 1–6 | 1–39 | 1–17 | 1–28 |
| Mean duration/ days (95% CI) | 4.8 (1–10) | 6 (3.4–8.6) | 2.9 (1.4–4.4) | 6.8 (0.5–12) | 6.3 (0.7–11.8) | 9.8 (3.4–16.1) |
| Males (n) | 30 | 46 | 24 | 32 | 24 | 41 |
| Hospitalization period (days) | 1–60 | 1–68 | 1–24 | 1–283 | 1–31 | 1–53 |
| Mean duration/ days (95% CI) | 7 (3.2–10.8) | 7.9 (4.5–11.2) | 6.0 (3.7–8.3) | 15.7 (-2.3–3.3) | 5.9 (2.5–9.3) | 10.2 (6.3–14.0) |

with the longest admission had suffered a penetrating injury whilst chopping wood. The second longest female admission was 28 days in a patient who had sustained hot mortar burns to eyes and face.

The hospitalization period in the males ranged from 1–283 days. The mean admission period was 8.8 days. Amongst the male patients, the longest stay of 283 days was a patient who sustained severe chemical injuries to his eyes. Other lengthy admissions of 53, 60 and 68 days occurred in male patients who had sustained severe chemical burns (wet cement, caustic soda and acid in respective cases). These patients required multidisciplinary care with plastic surgery involvement for skin grafting.

Fifty per cent of admitted injuries were open globe injuries. Fifty-five per cent of males and 31.5% of females sustained this type of injury (Table 5). Blunt contusions were

Four patients died: 3 males – 2 from head injuries (sustained after a motor vehicle accident and a gunshot injury) and the third from extensive thermal burns. The fourth was a female who succumbed to her other injuries from a motor vehicle accident.

DISCUSSION

Although ocular trauma may be the cause for 50–65% of eye emergencies in an eye casualty, 80% are usually minor trauma not requiring hospitalization (9–11). The annual incidence of hospitalized ocular trauma in our population was 2.5 per 100 000. Ocular trauma as a principal diagnosis was 13.2 per 100 000 in the USA, although this varies widely worldwide due to geographic and socio-economic factors (4, 12).

Males accounted for 80–84% of ocular trauma (2, 5, 13–15). The average age was 33 vs 49 years in males and

Table 5: Type of injury according to gender

| Injury | Total | Females | Males |
|------------------------|------------|----------------------------------|------------------------------------|
| Open globe injury | 126 (50%) | 17 (31.5%) | 109 (55.0%) |
| Blunt trauma contusion | 75 (29.8%) | 24 (44.4%) | 51 (25.8%) |
| Burns | 51 (20.2%) | 13 (24.1%) | 38 (19.2%) |
| Associated head injury | 24 (9.5%) | 4 (3 not limited to the eyes) | 20 (12 not limited to the eyes) |

more commonly seen in the females. Traumatic admissions due to burns were 20.2%, with 29% of patients with ocular burns having burns extending to the face, neck and other areas of the body.

Of patients admitted with ocular injury, 9.5% had associated head injury (cerebral concussion). Seventy-five per cent (3/4) of the female patients with head and ocular injuries were involved in a motor vehicle accident, the fourth was

females, respectively (5). This was similar to our study for the males. May *et al* found that the male to female ratio for ocular trauma was 4.6:1 in patients < 30 years, increasing to 7.4:1 in the 4th decade (16). However, after 70 years old the gender difference changes (4).

Fifty-two per cent of females sustained ocular injury at the home (5) compared with 40.7% in the home in the present study; 17.5% were recreational related unlike in only 2% of

males and none of the females in the present study. Desai *et al* showed that 30.2% of patients sustained injuries in the home and 15.8% in a sports or leisure facility in Scotland (6).

Work related injuries were 14.9% of admitted ocular trauma, which is similar to 12.6% of our males (17). In the present study, 11.1% of males and 14.8% of females sustained chemical ocular injury, which is much less than in the Asian population [19.2%] (1).

In the index study, the mean hospitalization period was 6.1 and 8.8 days in the females *versus* the males, respectively. This may be due to males having more open globe injuries, whereas females tended to have contusions. The admission period was longer than most studies which had a mean of 3.7 days (19). This could be related to the severity of injuries or social reasons. In Glasgow, the majority of serious injuries were contusions (20). In the USA, injuries sustained during hammering was 5.7%, compared to 14.3% in the present study (3). Burns was the least common cause of ocular morbidity, but resulted in the longest hospital admission.

The incidence of ocular hospitalization in this study appears low compared with the rest of the world. This may be due to bias from the patients attending UHWI. Although it is a tertiary hospital, it is not the major trauma centre in Jamaica. Also, there is a financial difference in cost for the patients attending this hospital *versus* the public hospitals, as patients may instead seek to attend a public hospital after an injury.

Work-related eye injuries have a significant impact on economic costs, with annual hospital charges ranging from US\$14.6–40 million (19). The cost of eye injury not only includes the direct costs of care but the time lost from productive activity and rehabilitation services where required. Where possible, we should try to implement preventative policies and education in order to reduce the cost of ocular adult trauma.

Only serious eye injuries require hospitalization so minor or moderate injuries were not considered. Patients with minor eye injuries may never seek care. Others with eye trauma may present to health clinics or private practices. And some patients may present late with cataract or retinal detachment and may be registered other than trauma, so the full ocular morbidity of ocular trauma is not captured. Likewise, occupational agricultural injuries may initially present as superficial trauma, but re-present as corneal ulceration and may be missed as ocular trauma as a cause for admission (2).

Epidemiology allows one to determine causal patterns of injury and when analysed can reduce this preventative problem. It allows the information to set up policies and educational programmes to reduce ocular trauma; whether it is secondary to recreation, motor vehicles or gunshot wounds. Policy changes with respect to eye protection, environmental controls and behavioural interventions have reduced eye injuries in the work place (21). This has also occurred with the use of laminated windscreens, seat belts

and bicycle helmets. As Kuhn said, prevention of an eye injury is preferable to the most effective treatment (22).

REFERENCES

- Négre AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiol* 1998; **5**: 143–69.
- Thylefors B. Epidemiological patterns of ocular trauma. *Aust N Z J Ophthalmol* 1992; **20**: 95–8.
- Kuhn F, Morris R, Witherspoon CD, Mann L. Epidemiology of blinding trauma in the United States Eye Injury Registry. *Ophthalmic Epidemiology* 2006; **13**: 209–16.
- Tielsch JM, Parver L, Shankar B. Time trends in the incidence of hospitalized ocular trauma. *Arch Ophthalmol* 1989; **107**: 519–23.
- Cillino S, Casuccio A, Di Pace F, Pillitteri F, Cillino G. A five-year retrospective study of the epidemiological characteristics and visual outcomes of patients hospitalized for ocular trauma in a Mediterranean area. *BMC Ophthalmol* 2008; **8**: 6.
- Desai P, MacEwen CJ, Baines P, Minassian DC. Epidemiology and implications of ocular trauma admitted to hospital in Scotland. *J Epidemiol Community Health* 1996; **50**: 436–41.
- Wong TY, Tielsch JM. A population-based study on the incidence of severe ocular trauma in Singapore. *Am J Ophthalmol* 1999; **128**: 345–51.
- McGwin G, Xie A, Owsley C. The rate of eye injury in the United States. *Arch Ophthalmol* 2005; **123**: 970–6.
- Edwards RS. Ophthalmic emergencies in a district general hospital casualty department. *Br J Ophthalmol* 1987; **71**: 938–42.
- Chiappella AP, Rosenthal AR. One year in an eye casualty clinic. *Br J Ophthalmol* 1985; **69**: 865–70.
- Vernon SA. Analysis of all new cases seen in a busy regional centre ophthalmic casualty department during 24-week period. *J R Soc Med* 1983; **76**: 279–82.
- Klopper J, Tielsch JM, Vitale S, Lai-Chu See, Canner J. Ocular trauma in the United States. Eye injuries resulting in hospitalization 1984–1987. *Arch Ophthalmol* 1992; **110**: 838–42.
- Soliman MM, Macky TA. Pattern of ocular trauma in Egypt. *Graefes Arch Clin Exp Ophthalmol* 2008; **246**: 205–12.
- Mansouri M, Faghihi H, Hajizadeh F, Rasoulnejad SA, Rajabi MT, Tabatabaey A et al. Epidemiology of open globe injuries in Iran: Analysis of 2,340 cases in 5 years. *Retina* 2009; **29**: 1141–9.
- Canavan YM, O'Flaherty MJ, Archer DB, Elwood JH. A 10-year survey of eye injuries in Northern Ireland, 1967–76. *Br J Ophthalmol* 1980; **64**: 618–25.
- 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.
- Baker RS, Wilson MR, Flowers CW Jr, Lee DA, Wheeler NC. Demographic factors in a population-based survey of hospitalized, work-related, ocular injury. *Am J Ophthalmol* 1996; **122**: 213–9.
- Loon S, Wong WL, Saw SM, Wang JJ, Wong TY. Prevalence and risk factors of ocular trauma in an urban Asian population: The Singapore Malay Eye Study (SiMES). *Invest Ophthalmol Vis Sci* 2007; **48**: E Abstracts 5480.
- Baker RS, Wilson RM, Flowers CW Jr, Lee DA, Wheeler NC. A population-based survey of hospitalized work-related ocular injury: diagnoses, cause of injury, resource utilization, and hospitalization outcome. *Ophthalmic Epidemiol* 1999; **6**: 159–69.
- MacEwen CJ. Eye injuries: a prospective survey of 5671 cases. *Br J Ophthalmol* 1989; **110**: 888–94.
- Lipscomb HJ. Effectiveness of interventions to prevent work-related eye injuries. *Am J Prev Med* 2000; **18** (4 Suppl): 27–32.
- Kuhn F. Ocular traumatology: prevention, prevention, prevention. *Graefes Arch Clin Exp Ophthalmol* 2010; **248**: 299–300.