The Incidence of Chemical Eye Injuries at Moorfields Eye Hospital 2013 – 2021

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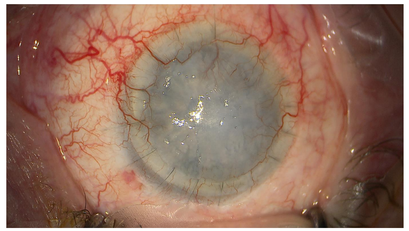
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Introduction

Severe ocular chemical injuries (SOCI) are medical emergencies. Previous studies have identified a common presentation of chemical eye injuries among young adult (20-30) males due to assault and workplace incidents[1,2]. The prevalence of SOCIs in the UK has not yet been established nor whether there are trends over time in their presentation[3]. This has implications for community and secondary care, as a treatable and preventable cause of corneal blindness and subsequent morbidity. Such outcomes of severe burns are depicted in the image below (Figure A).

Figure A: Image of patient case illustrating the long-term effects on the external eye after a severe ocular chemical injury (SOCI)



Here, limbal injury has led to ischaemia and stem cell failure. In turn, with corneal stroma structure alterations, there is a loss of corneal transparency. In advanced disease we see scleral and corneal neovascularisation.

Hypothesis:

1º hypothesis – determine the prevalence of chemical eye burns is higher in the male, working-age demographic and during the winter.

Aim:

1. To assess the incidence and baseline patient characteristics of severe ocular chemical injuries (SOCI) presenting to a specialist ophthalmic hospital with 24-hour accident and emergency care in London, UK.

Methods

This is a retrospective audit at Moorfields Eye Hospital, London including 5001 patients who presented to Eye Casualty with a chemical eye burn (CEB) between 2013-2021.

Patients were identified, firstly, if diagnosed with 'chemical injury' on discharge from A&E on electronic patient records (EPR). Secondly, pharmacy records for all prescriptions for potassium ascorbate and sodium citrate - protocol in management of acute severe CEBs. Injury severity was graded using both the Hughes-Roper-Hall (H-R-H) classification and the Dua classification. Cases with H-R-H Grade ≥ 3, Dua Grade ≥ IV or electronic pharmacy records of cases requiring prescriptions for potassium ascorbate and sodium citrate were included as SOCI. Baseline patient demographic details including, age, gender, ethnicity and Index of Multiple Deprivation (IMD)[4] score were collected. Presenting information on the cause of injury, injury setting, severity classification, best corrected visual acuity (BCVA) at presentation and discharge were also collated.

Data Analysis

Analysis was conducted using SPSS and Excel. Parametric data was analysed using a T-test and non-parametric using a Chi-square test.

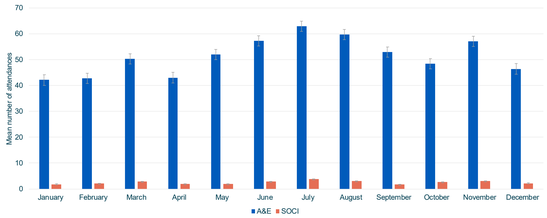
Results

Between 2013-20 there was a 38% increase in A&E attendees with CEBs. However, there was a 52% decrease in sodium ascorbate and potassium citrate, and therefore, SOCI presentations during the same time-period.

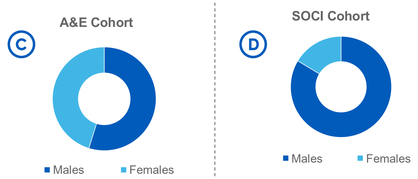
Figure A depicts the mean number of patients attending A&E per month (blue) as well as the mean number of this cohort found to have a SOCI per month (orange).

In both groups we observed a peak during the summer months, particularly July, in the number of patients visiting MEH with a CEB. December-February have the lowest mean visits.

Figure B: Mean number of patients attending A&E & those with a severe chemical ocular injury (SOCI) each month from 2013-21



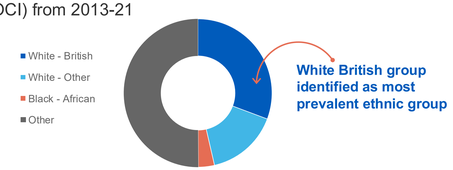
Figures C & D: Gender of patients, (C) attending A&E (D) with a severe ocular chemical injuries (SOCI) between 2013-21



There was a male preponderance, with men accounting for 54.8% of all CEIs and 83.6% of SOCIs.

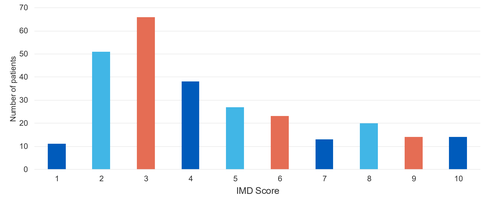
Further to this we identified the groups mean age to be roughly the same. A&E cohort was 37±17.3. SOCI was 37±15.6 years old. The same mode age group was identified in both as 25-29 years old.

Figure E: Ethnic group of patients with severe ocular chemical injuries (SOCI) from 2013-21



Just under half of all CEI cases (47%) were of a white ethnicity, with White British the most prevalent at 31%.

Figure F: Index of Multiple Deprivation (IMD) Scores in the severe chemical ocular injuries (SOCI) cohort



70% of this cohort with SOCIs live at a postcode with an IMD score ≤5. Those with a score of ≤2.5 belong to Lower Super Output Areas and are the most deprived areas in the country.

The Cause of Injury was found to be evenly spread: 34.8% workplace incidents, 33.3% assault incidents and 31.9% domestic incidents.

Finally, on analysis of the SOCI cohort's visual outcomes, 113 patients had their presenting and final BCVA recorded. The mean initial BCVA was a decimal value of 0.57(±0.43) or logMAR 0.22. The final BCVA was a decimal value of 0.75(±0.41) or logMAR 0.1.

The mean change in visual acuity was +0.18(±0.49) or an increase in logMAR from 0.22 to 0.1 (p=<0.001).

Conclusion

Chemical ocular injuries are a rare indication for presentation to ophthalmic A&E. Despite this we have found a higher than previously reported rate of severe injuries. We report a higher number of assault related SOCI in patients who lived at a postcode of IMD decile ≤5, suggesting an association between chemical eye injuries and socio-economic status.

Despite effective management, the best outcomes are seen through prevention. Understanding the prevalence of chemical burns and the demographics behind them is vital to establishing the groups most at risk of burns meaning we can target them with preventative measures to reduce the risk of injury.

References:

1. Loon SC, Tay WT, Saw SM, Wang JJ, Wong TY. Prevalence and risk factors of ocular trauma in an urban south-east Asian population: the Singapore Malay Eye Study. *Clinical & Experimental Ophthalmology*. 2009 May;37(4):362–7.
2. Hong J, Qiu T, Wei A, Sun X, Xu J. Clinical Characteristics and Visual Outcome of Severe Ocular Chemical Injuries in Shanghai. *Ophthalmology*. 2010 Dec 1;117(12):2268–72.
3. Macdonald ECA, Cauchi PA, Azuara-Blanco A, Foot B. Surveillance of severe chemical corneal injuries in the UK. *British Journal of Ophthalmology*. 2009 Sep 1;93(9):1177– 80.
4. IMD Postcode Checker [Internet]. [cited 2022 Mar 21]. Available from: https://www.fscbiodiversity.uk/imd/