Profile of occupational eye injury at an ophthalmologic emergency department

Perfil do trauma ocupacional ocular em
unidade de emergência oftalmológica

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ABSTRACT | **Background:** Eye injury is the most frequent reason for visits to ophthalmological emergency departments, being one of the leading causes of avoidable blindness worldwide and having considerable socioeconomic impact on health systems and populations. **Objective:** To establish the epidemiologic profile of eye injuries caused by work accidents, visual sequelae and socioeconomic impact. **Methods:** A retrospective, cross-sectional study was conducted by reviewing the medical records of patients with occupational eye injury treated at an ophthalmologic emergency department from April to August 2016. **Results:** A total of 112 patients were included, all of them male. The most affected age group was 31 to 35 years old, and the main professional category the one of mechanics; foreign bodies on the eye surface represented 85% of injuries; 72% of patients sought specialized treatment more than 12 hours after the accident; and for 86% this was their first treatment at the company. Half of the patients used personal protective equipment. In most cases the final visual acuity after injury was not impaired. **Conclusion:** Although most patients did not remain with visual sequelae, occupational eye injury resulted in loss of working days and expenses with medication. Studies such as the present one contribute to the mapping of the investigated problem and to the formulation of preventive strategies.

Keywords | eye; ophthalmology; vision disorders; accidents, occupational.

RESUMO | **Introdução:** Trauma ocular é o motivo mais frequente de atendimentos nas emergências oftalmológicas, sendo uma das principais causas de cegueira evitável no mundo e causando grande impacto socioeconômico no sistema de saúde e na população. **Objetivo:** Identificar o perfil epidemiológico dos traumas oculares decorrentes de acidentes de trabalho, as sequelas visuais e o impacto socioeconômico. **Métodos:** Estudo transversal, retrospectivo, por meio de revisão de prontuário dos pacientes portadores de trauma ocular ocupacional atendidos em emergência oftalmológica no período de abril a agosto de 2016. **Resultados:** Foram incluídos no trabalho 112 pacientes, todos do sexo masculino. A faixa etária mais acometida foi de 31 a 35 anos; mecânico foi a principal profissão; corpo estranho em superfície ocular representou 85% dos traumas; 72% dos pacientes levaram mais de 12 horas para procurar atendimento médico especializado; e 86% tiveram o primeiro atendimento na empresa. Metade dos pacientes usava equipamento de proteção. A acuidade final pós-trauma, na maioria dos pacientes, não sofreu impacto. **Conclusão:** Apesar de a maioria dos pacientes não ter apresentado sequelas visuais, o trauma ocular ocupacional levou à perda de dias de trabalho e a gastos com medicações. Estudos como este servem para mapear a problemática e traçar estratégias preventivas.

Palavras-chave | olho; oftalmologia; transtornos da visão; acidentes de trabalho.

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INTRODUCTION

Brazil ranks fourth in number of work accidents. Social Security data show that 2,135,342 accidents occurred from 2010 to 2012, corresponding to a mean of 711,781 accidents per year. According to estimates, such events might have had an annual cost of more than 4% the Brazilian gross domestic product (GDP) for the period from 2004 to 2008¹.

Eye injury is the most frequent cause of visits to ophthalmologic emergency departments, and one of the main causes of avoidable blindness worldwide². According to recent data, about 2.4 million cases of eye injury occur every year in the United States. Among these, about 1 million is due to work accidents, and 90% are mild and avoidable by simple protective measures³.

About 40% of cases of occupational eye injury involve metallurgy, metalwork and mechanic workers³⁻⁵. Industrial workers are exposed to hazards such as flying metal chips, eye burns and radiation injury, thus they represent a high-risk group for eye injury⁶.

Recovery of eye injuries demands for workers to remain one or more days away from work, and the visual prognosis does not depend on the implemented preventive measures only, but also on the quality and timeliness of the care provided, the severity of trauma, immediate complications and follow up. Injuries might have exponential negative impact on the quality of life of workers, and social, psychological and economic costs³.

The Occupational Safety and Health Administration (OSHA) asserts that eye injuries at the workplace have a cost of USD 300 millions per year from loss of productivity, medical treatments and workers' compensation⁴.

Although the number of studies on this subject in Brazil is small, accidents involving foreign bodies are believed to be the most prevalent, with rates varying from 54.6 to 81.8%⁷.

As a function of the aforementioned considerations, the aim of the present study was to investigate the various epidemiological risk factors associated with occupational eye injury in the state of Ceará, in addition to diseases representing ocular emergencies.

METHODS

In the present retrospective and cross-sectional study we reviewed the medical records of patients with occupational eye

injury cared at a reference ophthalmologic emergency department in the state of Ceará from April through August 2016.

The data were collected by one single investigator and entered into a form, comprising: age, sex, occupation, involved eye, trauma characterization, previous history of occupational trauma, job position, time until care delivery, cost of treatment, number of days away from work and impact of trauma on visual acuity.

RESULTS

A total of 112 medical records were reviewed, all corresponding to male patients. Half the patients were workers with formal employment relationship. The largest proportion of patients (16%) were mechanics (Graphic 1). The distribution of the sample per age range is depicted in Graphic 2.

Half the patients had used personal protective equipment (PPE) at the time of the accident. Most of the sample (55%) had history of previous eye injury. Ninety-six (85%) patients received first aid at the workplace. Relative to the mechanism of the accident, 95 (85%) were due to foreign bodies (Graphic 3).

Graphic 1. Distribution of occupational trauma per occupation, Ceará, 2016, 2016 (n=112).

As concerns the time from accident to specialized care delivery, 46 (41%) of the workers first received care 12 to 24 hours after the accident, 35 (31%) more than 24 hours later, 26 (23%) within 0 to 4 hours, 4 (4%) 4 to 8 hours after the event, and 1 (1%) within 8 to 12 hours since the accident.

Visual acuity after trauma was: 20/20 in 78 (69.6%) cases, 20/25 in 8 (7.1%), 20/30 in 11 (9.8%), 20/40 in 5 (4.4%), 20/50 in 2 (1.7%) and poorer than 20/50 in 8 (7.1%). The vast majority of the patients (97%) required just one

day away from work. The average cost of treatment was BRL 11.0 per patient as a function of the prescribed medications.

DISCUSSION

The results of the present study showed that occupational accidents most often involve men, which agrees the results of studies conducted in Mexico⁸ and the United States⁹. Also studies conducted in Brazilian ophthalmologic emergency departments corroborate these data. It is believed that men are more vulnerable because they perform higher risk activities compared to women¹⁰⁻¹².

Most of the analyzed patients were 21 to 40 years old, which corresponds to the economically active age range. This finding agree with the ones reported by Cohen et al.¹³ and Schellini et al.¹⁴. This fact suggests that occupational trauma reduces the productivity of companies, with the consequent losses for employers.

Half of the patients used PPE at the time of the accident. In 76% of the cases, PPE had been supplied by the employer, which possibly points to an interest of companies to reduce the number of accidents.

In regard to the mechanism of accidents, 85% corresponded to corneal foreign body, 7% to trauma not involving foreign bodies, 5% to chemical burns and 3% to electrical burns. Mollan and Thompson performed in 2009 a similar study in Scotland, with 3-month duration and divided in 2 stages. Corneal foreign body represented the most common type of injury, corresponding to 59% of eye trauma cases in the first stage of the study and to 64% in the second¹⁵. While this type of injury might be avoided through the use of protective equipment, employees still need to become aware of the relevance of PPE.

Mechanics, welders and metal industry workers were the most affected. One study performed in Turkey with 100 patients with metallic corneal foreign bodies due to work accidents found that 59% of them worked in the metal industry sector and 25% in civil construction⁷.

About 97% of the sample required just one day away from work and immediately resumed their activities while still under use of medication. In one study on occupational eye accidents in the city of Botucatu, São Paulo, from 1988 to 1992, Kara-José et. al. found that the average time away from work was 4.8 days¹⁶.

Graphic 2. Distribution of occupational trauma per age range, Ceará, 2016, 2016 (n=112).

Graphic 3. Distribution of occupational trauma per mechanism of accident, Ceará, 2016 (n=112).

Most patients exhibited satisfactory visual acuity after trauma, 76.7% with 20/20 and 20/25 vision. A possible explanation is the nature of the main mechanism of trauma involved, i.e., superficial corneal foreign body without major traumatic perforation or contusion. Only 7.1% of the sample had less than 20/50 vision.

CONCLUSION

Eye injuries due to work accidents represent a health problem in Brazil and worldwide. However, there are few reports on this type of accident from Brazilian health care services. Alves and Luchesi estimate that underreporting is

as high as 95%¹⁷. To this we must add the lack of information of workers on hazards and diseases to which they are exposed in certain jobs.

Foreign bodies remain as the main cause of trauma, especially among young male workers. Half of the patients stated the present was not the first occurrence of eye injury even though they used PPE. This finding denotes deficiencies in the orientation given on the use of the equipment, as well as in the planning for prevention of accidents.

Studies like the present one are essential for mapping the problem and formulating preventive and educational strategies targeting the main factors involved in occupational eye injury. Employers must improve the access to information on the use and relevance of PPE at the workplace.

REFERENCES

- Oliveira Filho JR, Oliveira ACR, Novo NF, Fernandes FC. Metodologia utilizada na investigação de acidentes de trabalho por empresas envolvidas em litígio trabalhista. *Rev Bras Med Trab.* 2016;14(2):94-9.
- Vasu U, Vasnaik A, Battu RR, Kurian M, George S. Occupational open globe injuries. *Indian J Ophthalmol.* 2001;49:43-7.
- Leal FAM, Silva e Filho AP, Neiva DM, Learth JCS, Silveira DB. Trauma ocular ocupacional por corpo estranho superficial. *Arq Bras Oftalmol.* 2003;66(1):57-60. <https://dx.doi.org/10.1590/S0004-27492003000100011>
- U.S. Department of Labor Bureau of Labor Statistics. Occupational injury and illness classification manual. 2012.
- Thompson GJ, Mollan SP. Occupational eye injuries: a continuing problem. *Occup Med.* 2009;59(2):123-5. <http://dx.doi.org/10.1093/occmed/kqn168>
- Fiebai B, Awoyesuku EA. Ocular injuries among industrial welders in Port Harcourt, Nigeria. *Clin Ophthalmol.* 2011;5:1261-3.
- Ozkurt ZG, Yuksel H, Saka G, Guclu H, Evsen S, Balsak S. Metallic corneal foreign bodies: an occupational health hazard. *Arq Bras Oftalmol.* 2014;77(2):81-3.
- Aguilar F. Repercusiones socioeconómicas de las lesiones por cuerpos extraños. *Salud Publica México.* 1985;27:66-70.
- White MF Jr, Morris R, Feist RM, Witherspoon CD, Helms HA, John GR. Eye injury: prevalence and prognosis by setting. *South Med J.* 1989;82:151-8.
- Araújo AAS, Almeida DV, Araújo VM, Góes MR. Urgência oftalmológica: corpo estranho ocular ainda como principal causa. *Arq Bras Oftalmol.* 2002;65:223-7.
- Alves MR, Kara-José N, Prado J, Usuba FS, Onclinx TM, Marantes CR. Ferimento perfurante ocular: 400 casos admitidos na clínica oftalmológica do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo. *Arq Bras Oftalmol.* 1995;58:342-5.
- Bernucci EA, Lopreto RCC, Rodrigues MLV. Traumatismos oculares em uma unidade de emergência. *Rev Bras Oftalmol.* 1993;52:407-11.
- Cohen J, Carvalho RC, Romão E. Trauma ocular por acidente de trabalho em Manaus (AM). *Rev Bras Oftalmol.* 1994;53(2):149-52.
- Schellini SA, Marchi NLM, Itoda LK, Silva MRBM, Sab N. Acidentes oculares graves decorrentes do trabalho. *Rev Bras Oftalmol.* 1993;52:55-62.
- Mollan SP, Thompson GJ. Occupational eye injuries: a continuing problem. *Occup Med.* 2009;59:123-5.
- Kara-José Jr. N, Oliveira-Neto JC, Silva ALB, Schellini SA. Acidentes oculares ocupacionais - ocorrência em Botucatu, no período de 1988 a 1992. *Arq Bras Oftalmol.* 1994;57:389-93.
- Alves S, Luchesi G. Acidentes de trabalho e doenças ocupacionais no Brasil: a precariedade das informações. *Inf Epidemiol SUS.* 1992;3:7-20.

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