

Prevalence of Ocular Injuries Due to Occupational Hazards in Cottage Industries of Lahore

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ABSTRACT

Objective: To find out the prevalence of ocular injuries due to occupational hazards in different cottage industries of Lahore. **Methodology:** This cross-sectional study was conducted among the participants working in cottages industries and having different types of ocular injuries due to occupational hazards. After the approval of the institutional ethical review board, eighty-two participants were recruited with the help of simple random sampling. The subjects of all age groups and the workers of industries who were directly exposed to occupational hazards were included in this study. Whereas the individual having mental retardation, or any other pathological disorders of the eye were excluded. Consent of the patients was taken, and the data was collected on a predesigned questionnaire. **Results:** Out of the total eighty-two subjects 7.32% laborers had penetrating injury, 10.96% laborers and 6.1% machine operator had non-penetrating injuries, 9.76% laborers had complaint of watering, 3.66% laborers and 2.32% machine operator had red eye after injury. Importantly, 23.17% laborers and 9.76% machine operators mentioned that they personally use safety goggles during work, 6.10% use eye shield and 1.22% use safety mask. Only 6.10% welders and 3.66% chemists said that the workplace management provided eye goggles and safety masks. Whereas 10.98% welders, 3.66% chemists and 6.10% other workers get treatment after any kind of injury. **Conclusion:** This study concludes that a significant percentage of the workers at cottage industries suffer from ocular injuries. Whereas the use of personal protective equipment at individual and management level is very low. It is recommended that the legal and educational policies must be implemented for the prevention of these ocular injuries.

Keywords: Ocular injury, trauma, cottage industry, eyecare professionals.

INTRODUCTION

Cottage industries, characterized by small-scale production within informal sectors, are vital for employment in developing countries, serving as a strategy to reduce unemployment. These industries, often family-run and home-based, utilize various hazardous substances that pose significant health risks, particularly to the eyes. The exposure to these materials is exacerbated by the workers' limited knowledge of the dangers and the proximity of their work to their living spaces, increasing the risk for both workers and their families. ⁽¹⁻⁴⁾ Home-based industries frequently employ highly toxic metals such as lead, mercury, cadmium, and arsenic, which can lead to severe health issues, including cognitive decline, hyperactivity, aggressive behavior, and ocular damage. The term "injury" originates from the Latin "in+jus," meaning "not right," highlighting that numerous physical and chemical agents can damage the human body, especially the eyes. Ocular injuries, which can lead to vision impairment or blindness, are classified by the Birmingham Eye Trauma Terminology (BETT) into closed and open eyeball injuries, as well as mechanical and non-mechanical injuries. Mechanical injuries include those caused by foreign bodies, blunt trauma, piercing trauma, and explosive injuries, while non-

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mechanical injuries result from harmful chemicals, thermal burns, and dangerous radiation. Such injuries are a leading cause of vision loss. ⁽⁵⁻⁸⁾ Occupational health aims to promote the highest level of physical, mental, and social well-being for workers in cottage industries and beyond. Its focus is on maintaining employee health, enhancing work capacity, creating a healthy and safe work environment, and fostering policies that support worker health and safety. ⁽⁹⁾ Globally, work-related eye injuries are a significant cause of preventable vision loss, with considerable social and economic impacts.

They account for a substantial proportion of emergency eye care visits. Industrial workers in small-scale home-based industries often suffer from incapacitating eye injuries, leading to Disability Adjusted Life Years (DALYs), visual impairment, and significant distress in the form of pain, psychological stress, and economic hardship. Ocular injuries are most common among men in highly industrialized areas, accounting for 70% of all eye complaints, with men facing a 2.2 to 5.5 times higher risk of ocular injuries than women. ⁽⁴⁾

In addition to the risks posed by toxic metals, cottage industry workers are also exposed to a variety of chemicals that can cause severe ocular damage. Such chemical-related eye injuries are considered urgent medical emergencies requiring immediate and thorough evaluation and treatment. Young workers, particularly those aged 20 to 40, are at the highest risk. A study on the incidence and prevalence of ocular chemical burns revealed that within a year, 171 patients suffered chemical eye injuries, with 61% occurring in cottage industries and 37% in home setting. These injuries are often caused by acids and alkalis; acids can lead to the destruction of the ciliary body and reduced aqueous humor production, while alkalis may penetrate the anterior chamber, causing cataracts, ciliary body damage, and trabecular meshwork destruction. This highlights the critical need for safety measures and education to protect workers' vision in these environments. ⁽⁸⁾ This study was conducted to ascertain the prevalence of ocular injuries due to occupational hazards in cottage industries of Lahore. It highlights the urgent need for enhanced safety measures and education to mitigate the risks faced by workers, particularly those exposed to hazardous chemicals and toxic metals that can cause severe eye injuries and other health issues. ⁽⁵⁾

METHODOLOGY

This descriptive cross-sectional study was conducted among the workers of cottages industries having different types of ocular injuries. After the approval of institutional ethical review board, the subjects were recruited from the workers of cottage industries who were directly exposed to occupational hazards. Simple random sampling technique was used for the selection of the participants. A sample of 82 subjects was calculated with the help of the following formula.

$$n = \frac{Z^2 1 - \alpha / 2 \times P (1 - P)}{d^2}$$

$$\begin{aligned}
 Z^{2}1-\alpha/2 &= \text{Standard normal variate} \\
 P &= \text{prevalence taken from previous study}^9 \\
 d &= \text{absolute error} \\
 &= \frac{(1.96)^2 (0.689) (1-0.689)}{(0.10)^2}
 \end{aligned}$$

All the workers of cottage industries exposed directly to occupational hazards were included in the study whereas the mentally retarded and individuals with other ocular pathologies were excluded from the study. The ocular injuries were the dependent variable and age, gender, visual acuity, work type, work condition and training in occupational safety were considered as the independent variables. A pretested questionnaire was used for the collection of data by visiting different cottage industries. The informed consent was obtained, and participant's complaints, history of ocular injuries and use of protective measures was recorded. The data was organized, entered in the SPSS 25, and analyzed with the use of statistical tools.

RESULTS

Out of the total eighty-two participants 40.2% were laborers, 15.9% were machine operators, 15.9% were working in welding industries, 6% were chemist and 22% were others beside laborers, chemist, and welders. The percentage of the participants based on different work categories is presented in Table-1.

Table 1: Type of work-based percentage of the study participants

Occupation	Percentage
Laborers	40.20
Machine Operators	15.90
Welders	15.90
Chemists	6.00
Others	22
Total	100

The results indicate that 7.32% of the cases involved penetrating injuries, while a comparatively higher percentage of 10.96% were non-penetrating injuries. Additionally, 9.76% of the subjects reported watering from eyes and 3.66% experienced red eyes following the injury. A subsequent observation revealed that 6.10% of the subjects had non-penetrating injuries without any accompanying watering complaints or red eyes. The results showed that 4.88% of the subjects suffered from non-penetrating injuries and subsequently developed red eyes. Symptoms of red eye were found in 3.66% of the subjects. The data on personal safety equipment usage reflects the percentage of subjects who utilized various protective gear. The study shows that 23.17% of the participants used safety goggles, which is the highest usage rate among the equipment surveyed. In contrast, the personal use

of eye shields was reported by only 6.10% of the subjects, and a mere 1.22% used a safety mask. Further analysis reveals that 9.76% of the subjects used safety goggles exclusively, without accompanying eye shields or masks. Additionally, 8.54% of the participants used safety goggles, 2.44% used eye shields, and 4.88% used safety masks in combination. There was also a 1.22% usage rate for eye shields alone, and 6.10% of the subjects used both safety goggles and eye shields.

The results indicate that 47.57% of the subjects used safety goggles at some point, 15.86% used eye shields, and 6.10% used safety masks. This suggests a significant reliance on safety goggles as the primary form of personal protective equipment among the subjects, with less frequent use of eye shields and safety masks.

The results showed that 26.83% of the subjects were provided with safety goggles. Eye shields were provided to 4.88% of the subjects, and safety masks were the least provided, with only 1.22% of subjects receiving them. Overall, the cumulative percentages revealed that 37.81% of the subjects were provided with safety goggles, 7.32% with eye shields, and 3.66% with safety masks by the management. The result about the visit to eye doctor are presented in figure 1.

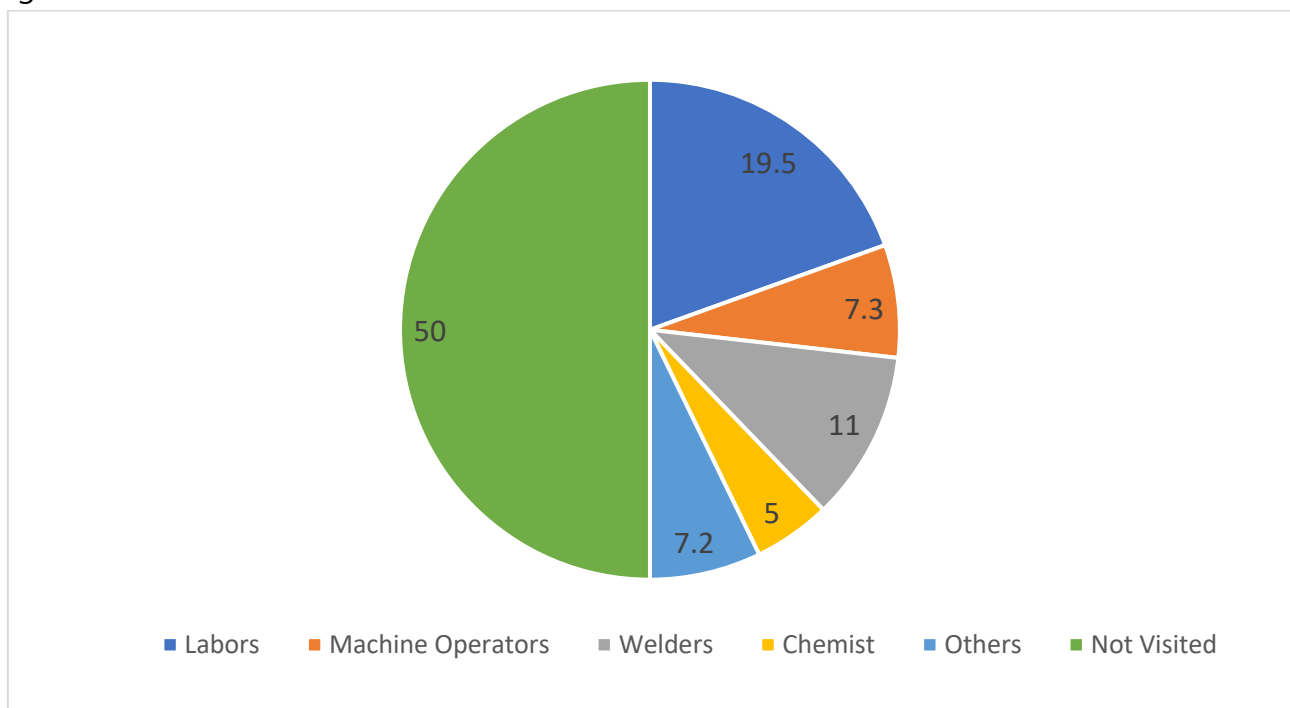


Figure 1: Percentage of workers, presenting to the ophthalmologists after eye injuries.

DISCUSSION

Work-related well-being is the promotion of the highest level of physical, mental, and social health for employees in various industries. The focus is on maintaining employee health, enhancing work capacity, and creating a safe and supportive environment. This includes formulation of policies that safeguard workers' health and safety. In developing countries, eye injuries in welding industries contribute to 2.3% of Disability Adjusted Life Years (DALYs) lost

due to occupational hazards. Previous studies have not adequately addressed the use of protective equipment, focusing instead on occupational risks faced by welders. It is crucial to educate welders about protective gear and its proper use. Occupational eye injuries affect laborers, machine operators, and those working with various machinery and materials. Proper management of risk factors can prevent eye injuries in these settings.

In recent years, studies show that both government entities and local industries have demonstrated commendable strides in prioritizing the welfare and protection of cottage industry workers. Unlike previous years, robust measures are now in place to ensure their safety and well-being, mitigating risks and hazards inherent in their occupations.

Enhanced regulations, comprehensive training programs, and accessible healthcare services have been implemented to address longstanding concerns. Furthermore, increased financial support and incentives aim to uplift their socio-economic status, fostering a more sustainable and inclusive environment for cottage industries. These concerted efforts signify a promising shift towards a more equitable and supportive framework for cottage industry workers. ⁽⁶⁾ In developing countries, cottage industry workers often forego immediate treatment and neglect other rehabilitation measures due to the immense stress and workload they endure. The relentless demands of their work often leave little time or energy for addressing their health concerns or seeking necessary assistance. With long hours and limited resources, prioritizing healthcare or rehabilitation becomes a luxury many cannot afford. Consequently, ailments or injuries are frequently endured without proper attention, exacerbating their conditions, and perpetuating a cycle of neglect.

This stark reality underscores the urgent need for improved support systems and access to healthcare services tailored to the unique challenges faced by cottage industry workers in developing nations. ⁽⁷⁾ This study aimed to assess the prevalence of occupational eye injuries in Lahore's cottage industries. A cross-sectional survey of 82 participants was conducted, excluding those with mental disabilities or other eye pathologies, and those unable to provide data or answer questions. Participants answered 18 questions about their work and any injuries sustained. The findings revealed that 40.2% of participants were laborers, 15.9% machine operators, 15.9% welders, 6.1% chemists, and 22% other roles. They worked under varying lighting conditions, with a significant number reporting previous eye injuries. The study highlights the importance of protective measures and prompt medical attention following eye injuries in the workplace. ⁽⁸⁾ It was found that a significant portion of laborers took immediate action following an injury, with 20.73% irrigating their eyes right away. Training on workplace safety was less common, with only 6.10% having received relevant training and 1.22% having it occasionally. Satisfaction with workplace safety measures was reported by 12.02% of laborers, and personal use of protective equipment was relatively high, with 23.17% using safety goggles, 6.10% using eye shields, and 1.22% using safety masks. Additionally, 26.83% reported that their management provided safety goggles, 4.88%

received eye shields, and 1.22% were given safety masks. Cottage industry laborers, often lacking adequate training, face heightened risks of ocular injuries. Their job satisfaction is compromised as injuries lead to reduced productivity and long-term implications. Improved training and safety protocols are imperative to mitigate ocular hazards and enhance overall job satisfaction among cottage industry workers.⁽⁹⁾ For machine operators, 6.1% experienced non-penetrating injuries, and 2.44% suffered chemical injuries, including alkali-related injuries. After injury, 7.31% irrigated their eyes, and 7.32% sought medical attention from an eye doctor. Training was slightly more prevalent among machine operators, with 4.88% having regular training and 8.66% receiving it occasionally. Satisfaction with industry-provided safety measures was mixed, with 9.76% satisfied and 4.88% dissatisfied. Personal use of protective gear was noted, with 9.76% using safety goggles and 2.44% using face shields. Industry provision of safety equipment was reported by 10.98% for goggles, 1.22% for eye shields, and 1.22% for safety masks. Improvement in ocular symptoms after treatment was reported by 7.32%, with 2.44% noting occasional improvement.⁽¹⁰⁻¹¹⁾

Chemists revealed that 4.88% of welders experienced non-penetrating injuries, while 1.22% of welders and other workers suffered chemical-type injuries. A small percentage reported acidic injuries, and various symptoms were observed post-injury, including watering, redness, and blurred vision. Notably, 7.32% of welders and 2.44% of other workers experienced blurred vision. Immediate irrigation of the eye after injury was reported by 10.98% of welders and 4.88% of chemists, with a similar percentage seeking professional eye care. However, 1.22% did not seek any medical attention. Workplace safety training was received by 8.54% of welders and 4.88% of chemists, with some receiving it only occasionally. Regarding workplace safety communication, 7.32% of welders reported not being informed, while 1.22% of chemists and 6.10% of other workers were. Satisfaction with safety measures varied, with some workers expressing dissatisfaction. Personal use of protective equipment was also varied, with 2.44% of welders using eye shields and 4.88% using safety masks. A small percentage of chemists and other workers used face shields, and 8.54% of workers in other industries used safety goggles. Management provided eye goggles to 6.10% of welders and 3.66% of chemists, with fewer receiving safety masks.⁽¹²⁻¹⁵⁾ Treatment after injury was sought by 10.98% of welders, 3.66% of chemists, and 6.10% of other workers, with some reporting improvement in ocular symptoms after treatment.

CONCLUSION

In conclusion, this research has highlighted the significant prevalence of occupational eye injuries within Lahore's cottage industries. The findings underscore the critical need for comprehensive safety training, the provision of adequate protective equipment, and the establishment of effective safety protocols to mitigate the risks associated with various occupational roles. The study advocates for a more proactive approach to workplace safety,

emphasizing the importance of immediate action following an injury, consistent use of personal protective equipment, and prompt access to medical care. It calls for industry leaders and policymakers to prioritize worker health and safety, particularly in developing countries where such incidents are more prevalent and often underreported.

REFERENCES

1. Kenton, W. (2023). Cottage Industry. Retrieved from <https://www.investopedia.com/terms/c/cottage-industry.asp> dated: march 6th, 2024.
2. MasterClass. (2022). Cottage Industry Definition: 4 Examples of Cottage Industries. Retrieved from <https://www.masterclass.com/articles/cottage-industry> dated: february 13th, 2024.
3. Lip, G. (2020). Cottage Industry. Retrieved from <https://corporatefinanceinstitute.com/resources/economics/cottage-industry/> dated: february 1st, 2024.
4. Saniya Akhtar. (2017). Pubmed Central. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5447337/> dated: january 16th, 2024
5. Haider, S. H. (2023). scispace. Retrieved from <https://typeset.io/questions/issues-of-cottage-industry-in-pakistan-302yzn47nu> dated: march 14th, 2024
6. Khan, N. (2018). CORE. Retrieved from <https://core.ac.uk/download/pdf/234685706.pdf>
7. Anjum, M. (2017). ResearchGate. Retrieved from https://www.researchgate.net/publication/272717921_Health_Status_of_Cottage_Industry_Workers_in_Ambedkarnagar_District dated: march 11th, 2024.
8. Kosteas, V. D. (2023). Job satisfaction and employer-sponsored training. Retrieved from <https://onlinelibrary.wiley.com/doi/full/10.1111/bjir.12741> dated: march 2nd, 2024.
9. Nina Jovanovic. (2016). Prevalence and risk factors associated with work-related eye injuries in Bosnia and Herzegovina. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5137557/> dated: january 10th, 2024
10. Ezinne, N. E. (2021). PubMed Central. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8706099/> dated: january 8th, 2024
11. Hussain, D. S. (2020). MAR Case Reports. Retrieved from https://www.medicalandresearch.com/assets/articles/documents/DOCUMENT_20201023122045.pdf dated: january 16th, 2024
12. Jung, S. (2020). Science Direct. Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0925753519321915> dated: february 6th, 2024.
13. Anderson, A. R. (2015). ResearchGate. Retrieved from https://www.researchgate.net/publication/274724777_Top_Five_Industries_Resulting_in_Injuries_from_Acute_Chemical_Incidents_Hazardous_Substance_Emergency_Events_Surveillance_Nine_States_1999-2008. Dated: february 5th, 2024
14. Center, M. I. (2023). Chemical Accidents and Exposures. Retrieved from <https://www.maritimeinjurycenter.com/accidents-and-injuries/chemical-exposures/> dated: march 7th, 2024.
15. Seth, R. (2021). Medscape. Retrieved from <https://emedicine.medscape.com/article/1277764-overview?form=fpf>. Dated: february 19th, 2024.