

Factors Associated With Eye Complaints Among Welders at PT. X In Batam City

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Abstract

Introduction: Occupational safety and health (OSH) is a critical aspect in the welding industry, which poses a high risk to workers' eye health. Exposure to ultraviolet radiation, hot metal splashes, and welding fumes can lead to eye disorders ranging from mild irritation to severe damage such as blindness. **Objective:** This study aimed to identify factors associated with eye complaints among welders at PT X in Batam City. **Method:** A quantitative approach with a cross-sectional study design was used. A total of 40 welders were selected as respondents through total sampling. Data were collected using questionnaires and interviews to measure variables such as safe behavior, OSH training, technical skills (OSH skills), and eye complaints. Data analysis was conducted using univariate and bivariate methods with the chi-square test at a significance level of $\alpha = 0.05$. **Result and Discussion:** The results showed that 60% of respondents exhibited unsafe behavior, 62.5% had received OSH training, 70% possessed OSH skills, and 60% experienced eye complaints. A significant relationship was found between safe behavior, OSH training, and OSH skills with eye complaints ($p=0.001$). **Conclusion:** These findings highlight the importance of promoting safe work behavior, effective OSH training, and skill enhancement to prevent eye health problems among welding workers.

Introduction

In the world of work, the relationship between people, work equipment, and environmental conditions is a crucial element in ensuring occupational safety and health (OSH) (Fauzi, Rhomadhoni, Wijaya, & Handayani, 2023); (Furtina & Widajati, 2023). One of the senses most vulnerable to occupational risks is the eyes, particularly in jobs with high exposure to light and radiation, such as welding (Kurniawan, 2017). The eyes play a vital role in work activities, so their health needs to be taken seriously, especially in terms of lighting and radiation exposure (Nasution, 2022)

Welding work has a high risk of eye health problems due to exposure to ultraviolet (UV), infrared, hot metal splashes, and metal fumes (SANDRA & Gazali, 2021); (Ari et al., 2025). This exposure can cause complaints ranging from irritation, conjunctivitis, photokeratitis, decreased vision, to blindness (Zhafira, Riviwanto, & Gusti, 2024); (AOA, 2021). *American Optometric Association* It is stated that photokeratitis is an injury to the cornea due to exposure to intense light, which is characterized by red eyes, pain, and temporary visual impairment.

Data from the Social Security Administration Agency (BPJS) notes that work accidents are still high, with around 130,000 cases every year (BPJS, 2018). In the welding sector, eye disorders are one of the dominant complaints. The results of the study show that the low use of personal protective equipment (PPE) and the lack of OSH training and skills are the main causes of high eye complaints in welding workers (BR TOBING, 2023); (Arrasyid, Rizal, & Mustopa, 2025)

Adequate OSH training and good work skills play an important role in reducing the number of eye complaints. Workers who regularly attend OSH training tend to better understand work risks, implement safe procedures, and use PPE consistently (Rusnaenah, Ismono, Imdam, & Pramesty, 2025). A study by Suwandi (2022) showed a significant relationship between OSH training and the incidence of eye complaints ($p\text{-value} = 0.002$), confirming the importance of education and skills aspects in occupational risk prevention.

An initial survey conducted at PT X revealed that some welders experienced symptoms of eye disorders such as glare, sandy sensations, and headaches due to exposure to welding rays. This complaint is allegedly related to the lack of use of PPE and repeated exposure to UV radiation. This condition shows that there is still a gap in the implementation of safe work behavior and the need to improve OSH training and skills.

Based on this background, this study aims to identify factors related to eye complaints in welders at PT X, focusing on the behavior of using PPE, OSH training, and occupational safety skills possessed by workers.

Method

This type of research is quantitative with a cross-sectional approach. The research was conducted at PT X Batam City from April to June 2025. The research sample is a total population (total sampling) of 40 welders.

Data collection instruments are in the form of questionnaires and structured interviews. Independent variables are safe behavior, OSH training, and OSH skills; while the dependent variable is eye complaints. Data were analyzed univariate and bivariate using chi-square test ($\alpha = 0.05$).

Results and Discussion

Bivariate Analysis

Table 1

The Relationship Between Safe Behavior and Eye Complaints in Welder Workers at PT X Batam City

Safe Behavior	Eye Complaints				Total	P VALUE
	There are complaints		No complaints			
	n	%	n	%	N	%
Unsafe	24	60	0	0	24	60
Safe	0	0	16	40	16	40
Total	24	60	16	40	40	100

Table 2

The Relationship Between OSH Training and Eye Complaints in Welder Workers at PT X Batam City

A. Data on City						
OSH Training	Eye Complaints				Total	P VALUE
	There are complaints		No complaints			
	n	%	n	%	N	%
None	15	37.5	0	0	15	37.5
Exist	9	22.5	16	40	25	62.5
Total	24	60	16	40	40	100

Table 3

The Relationship Between OSH Skills and Eye Complaints in Welder Workers at PT X Batam City

Bataan City						
Skill OSH	Eye Complaints				Total	P VALUE
	There are complaints		No complaints			
	n	%	n	%	N	%
Not Have	12	30	0	0	12	30
Have	12	30	16	40	28	70
Total	24	60	16	40	40	100

The relationship between each independent variable (safe behavior, OSH training, and OSH skills) and the dependent variable (eye complaints). The test used was the chi-square test at a significance level of 5%. Based on Table 3,4,5, the results of the analysis showed that all respondents with unsafe work behavior (24 people) experienced eye complaints, while none of the 16 respondents with safe behavior experienced complaints. This shows a very strong relationship between work behavior and eye complaints, with a p value of 0.001 ($p < 0.05$).

In the OSH training variable, out of 25 respondents who had participated in the training, only 9 people (36%) experienced eye complaints. On the other hand, all 15 respondents who had never participated in the training experienced eye complaints. This reinforces the role of training in preventing the risk of eye health disorders, also with a p-value of 0.001.

For the OSH skill variable, of the 28 respondents who had work skills, only 12 people (42.9%) experienced eye complaints. However, all the workers who did not have skills (12 people) had complaints. This again showed a significant association ($p = 0.001$), suggesting that adequate work skills can reduce the risk of eye disorders due to welding.

Overall, the three independent variables had a significant relationship with eye complaints, suggesting that the better a worker's work behavior, training, and technical skills, the lower the risk of eye disorders.

1. There was a significant association between safe behavior and eye complaints ($p=0.001$)
2. There was a significant relationship between OSH training and eye complaints ($p=0.001$)
3. There was a significant relationship between OSH skills and eye complaints ($p=0.001$).

These results support previous research that states that occupational safety knowledge and training can improve compliance with the use of PPE. Research by Dimkatni et al. (2024) concluded that the level of knowledge and working time was related to the use of personal protective equipment in pesticide spraying farmers. In the context of welders, safe behavior is highly influential because the welding process involves bright light and metal particles that can cause eye irritation and damage.

Workers who receive OSH training tend to have a better understanding of occupational risks and how to prevent them. Training not only raises awareness, but also forms safe work habits. This is in line with the Health Belief Model, which states that the perception of risks and benefits can motivate a person to change behavior.

Meanwhile, technical skills (OSH skills) allow workers to carry out tasks with the correct procedures. Unskilled workers often work in a hurry or carelessly, and ignore safety measures such as the use of eye protection.

These three factors synergistically play a role in preventing eye complaints. The findings of this study suggest that safe behavior improvement interventions, training, and technical skills are effective strategies to reduce the risk of eye complaints in the welding industry. Therefore, companies are advised to make training and skills evaluation part of their regular occupational safety programs.

Conclusion

There is a significant relationship between safe behavior, OSH training, and OSH skills with eye complaints in welders at PT X Batam City.

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