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Occupational Eye Problems among the Workers of Patan Industrial State, Nepal

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Abstract

Occupational health is an essential public health area that promotes and safeguards workers' physical, mental, and social well-being across all industries. This study focuses on workplace safety, particularly in developing countries like Nepal, where occupational safety and health (OSH) practices are often insufficient. This study aims to assess occupational health hazards, particularly the causes of vision problems, faced by workers in the Patan Industrial Area, Nepal. The study utilized a quantitative method with a descriptive design, which surveyed 147 workers in the industry who attended health clinics. The findings highlighted significant issues, such as refractive errors and dry eyes which were primarily linked to office work and exposure to polluted and chemically hazardous work environments. Moreover, the study findings also highlight the importance of strengthening OSH policies, implementing worker safety programs, and introducing targeted interventions to improve health outcomes and enhance workplace productivity.

Keywords: Eye health, eye problems, occupational safety and health, occupational health, workers, workplace health and safety

Introduction

Occupational health focuses on promoting and maintaining workers' physical, mental, and social well-being in all occupations. According to the World Health Organization (WHO), this field encompasses various disciplines, including occupational medicine, nursing, ergonomics, psychology, hygiene, and safety (WHO, 2021, 2024). The primary aim is to create safe working environments that enhance productivity and efficiency while minimizing health risks. Recent studies, such as Andersen et al. (2019), show that improving workplace safety prevents injuries, reduces chronic diseases, lowers healthcare costs, and enhances workers' quality of life.

Building on the goals of occupational health, Occupational Safety and Health (OSH) interventions play a critical role in translating these objectives into actionable measures to protect workers. For instance, during the COVID-19 pandemic, OSH interventions ensured safe working environments to control virus spread (Boniol et al., 2022). While many developed countries have embraced OSH practices, it remains underdeveloped in numerous developing nations, such as Nepal, where only 7% of the labor force works in industries prioritizing safety measures (Prajapati et al., 2023). Challenges such as high illiteracy rates among workers, a lack of OSH awareness, inadequate regulatory enforcement, and outdated safety equipment further hinder the realization of occupational health's objectives (Shrestha et al., 2020; NG & Chellapalli, 2023).

Workplace eye injuries are a major public health problem, which affects millions of workers worldwide and leading to significant economic losses. According to the WHO, nearly half of the global population experiences preventable vision impairment, with a notable portion attributed to occupational hazards (Vanathi, 2023). These injuries arise from various sources, including mechanical trauma from flying objects, harmful chemical exposure, and poor ergonomic conditions (ILO, 2023; Kyriakaki et al., 2021). Research highlights that impacts from moving objects account for a significant share of these incidents, making them the leading cause of workplace eye injuries (Omar et al., 2022).

The consequences extend beyond individual health, significantly affecting workplace productivity and safety. It is essential to ensure ocular health in professional settings to safeguard employee well-being and enhance organizational performance. In Nepal, workers in industries like sugar, jute, soap, and dairy face heightened risks due to exposure to dust, chemicals, and physical trauma. The situation is worsened by the lack of adequate protective eyewear, with only 19% of workers reporting its use, primarily due to unavailability (Patel et al., 2024). This gap in safety measures contributes to the high prevalence of eye injuries and long-term vision impairment. Furthermore, factors such as age, gender, occupation type, and income levels significantly influence the occurrence and severity of these conditions (Patel et al., 2024).

Eye health in the workplace is essential to address the existing challenges. Recent collaborations between organizations like the ILO and local health institutions have begun to tackle these issues through comprehensive eye screenings and awareness campaigns (IAPB, 2024). These initiatives seek to promote preventive care and create a safety culture for eye health in Nepal's workplaces. However, awareness of Occupational Safety and Health (OSH) standards related to sensory health risks is still low among workers and employers. To create a safer working environment, there is a pressing need for informed interventions that can mitigate these risks. This research highlights the gaps in current OSH practices and proposes targeted solutions to influence policy changes,

encouraging the adoption of more comprehensive safety measures. Such advancements are vital for reducing occupational eye health risks, boosting worker productivity, and fostering a culture that prioritizes safety and health.

The necessity for this study is underscored by the prevalence of work-related sensory issues that can lead to chronic health problems, decreased productivity, and a lower quality of life for affected workers. Many industries expose workers to pollution, airborne particles, chemicals, and inadequate lighting, resulting in significant health risks like vision impairment. These conditions not only affect individual workers but also impose a substantial economic burden on healthcare systems and society as a whole. Therefore, this study aims to assess the current workplace environment and identify specific eye-related hazards in the Patan Industrial State, Lalitpur, Nepal.

Methods

This study used a quantitative method and a descriptive research design to examine occupational eye problems among workers. It used the survey approach to systematically assess the prevalence and nature of ocular issues within the target population. The study used a survey method to gather data from a population of 147 workers who were present at the health camp in the Patan industrial area, Lalitpur, Nepal. The sampling approach involved selecting these workers based on their availability during the event. An interview questionnaire was used to conduct face-to-face interviews with the workers available during the health camp. The structured questionnaire gathered demographic details, occupational history, and specific eye health concerns, offering a comprehensive understanding of workers' ocular health in this industrial setting. Health problems reported by participants were verified using health camp records to ensure accuracy. Data were entered into SPSS software and analyzed descriptively using univariate and multivariate tables.

Results

This section describes the common eye problems experienced by the respondents.

Sensory Problems

Table 1

General Sensory Problems among the Workers

Characteristics	Frequency	Percent
Eye	54	36.7
Ear	14	9.5
Both	18	12.2
No problem (NAD)	61	41.5
Total	147	100.0

The majority of respondents, 36.7%, had eye problems, followed by eye and ear problems, 12.2%. The minimum number of participants, 9.5%, had ear problems, and 41.5% had no problems with them.

The data indicates that eye problems are the most common among respondents, with a smaller percentage reporting ear problems or both types of issues. This distribution may reflect broader trends in health concerns related to vision and hearing, which can be influenced by factors such as age, lifestyle, and environmental conditions. Addressing these health issues effectively could enhance the quality of life for those affected.

Type of Eye-Related Problems

Table 2

Visual Problems among the Workers

Characteristics	Frequency	Percent
Cataract	4	3.5
Corneal Scar	3	2.7
No eye problem	42	37.2
Refractive error	53	46.9
Dry eye and red eye	10	8.8
Glaucoma	1	0.9
Total	113	100.0

The prevalence of refractive error was the most commonly reported visual problem, affecting 46.9% of respondents. 8.8% of participants noted dry eye and red eye issues, potentially linked to environmental factors or prolonged screen exposure. Other conditions, such as cataracts (3.5%), corneal scars (2.7%), and glaucoma (0.9%), were less frequently reported, suggesting a lower prevalence of these issues in the studied population.

Office work is prevalent among participants, indicating potential health risks associated with prolonged screen time and sedentary behavior. Understanding these work-related factors is essential for developing targeted health interventions and promoting workplace wellness initiatives that address the unique challenges different occupational groups face. Of the various eye problems, refractive error has the highest percentage, followed by dry eye and red eye. The data demonstrates that refractive errors are the predominant visual problem among respondents, necessitating regular eye examinations and corrective measures to prevent potential vision loss. Addressing these issues is crucial for improving overall eye health and reducing the population's visual impairment burden. Various studies show that timely intervention can significantly enhance the quality of life and productivity for those affected by refractive errors and other visual problems (Karki & Karki, 2004).

Table 3

Caste-wise Eye Problems among the Respondents

Caste	Eye problems						
	Cataract	**Corneal Scar**	**No eye problem**	**Refractive error**	**Dry eye and red eye**	**Glaucoma**	**Total**
Brahmin/Chhetri	1	0	9	13	0	0	23
Dalit	0	0	3	2	2	1	8
Janajati	3	2	25	31	7	0	68
Tarai Caste	0	1	5	7	1	0	14
Total	4	3	42	53	10	1	113

Table 3 illustrates the prevalence of various eye problems among respondents categorized by caste. The data reveals that refractive error is the most common issue, affecting 53 individuals, with the highest incidence among the Janajati group (31 cases). Following refractive errors, dry eye, and red eye conditions were reported by ten respondents, while cataracts and corneal scars were noted in a smaller number of cases (4 and 3, respectively). Notably, glaucoma was observed exclusively within the Dalit community, indicating a possible caste-related trend in eye health issues.

Table 3 also highlights that a significant portion of respondents (42) reported having no eye problems, which may suggest varying levels of access to eye care or differences in awareness about eye health across different castes. The findings underscore a substantial prevalence of refractive errors and other shared vision issues, pointing to potential eye health disparities among different caste groups. This calls for targeted healthcare interventions that address these disparities and promote better awareness and access to eye care services tailored to the needs of specific communities.

Table 4

Sex-wise Eye Problems among the Respondents

Sex	Eye problems						Total
	Cataract	**Corneal Scar**	**No eye problem**	**Refractive error**	**Dry eye and red eye**	**Glaucoma**	
Female	0	0	13	17	1	0	31
Male	4	3	29	36	9	1	82
Total	4	3	42	53	10	1	113

Table 4 shows that refractive error was the most common eye problem among male (36) and female (17) respondents. Dry and red eyes were more common in males than females. Cataracts and glaucoma were not detected among female respondents, and 29 male and 13 female respondents had no eye problems.

The data highlights significant gender differences in the prevalence of various eye problems. While refractive errors are common among both sexes, males exhibit higher

rates of dry eye conditions and certain diseases like cataracts and glaucoma. These findings could inform targeted health interventions and awareness campaigns tailored to address the specific needs of each gender regarding eye health.

Table 5

Type of Work-wise Eye Problems among the Respondents

Type of work	Eye problem						Total
	Cataract	Corneal Scar	No eye problem	Refractive error	Dry eye and red eye	Glaucoma	
Office work	0	1	12	11	2	0	26
Marketing	2	0	1	3	3	0	9
Working in a hot area	0	0	11	9	1	0	21
Working in a noisy area	2	1	14	22	2	0	41
Painting and chemical	0	0	2	5	0	0	7
Security work	0	1	2	3	2	1	9
Total	4	3	42	53	10	1	113

Table 5 shows that most respondents who work in noisy areas suffer from refractive error problems, while the number is lower among marketing and security workers. The data illustrates that refractive errors are respondents' most significant eye health issue, particularly those in noisy work environments. This suggests a need for targeted interventions, such as regular eye examinations and the use of protective eyewear, especially in occupations where environmental factors may exacerbate eye problems. Addressing these issues could improve overall eye health and productivity in the workplace.

Eye Problem and Duration of Work

Table 6

Type of Eye Problem and Working Duration

Eye problems	Working duration			
	Less than 5 Years		More than 5 Years	
	Number	Percent	Number	Percent
Cataract	2	50.0	2	50.0
Corneal Scar	1	33.3	2	66.7
No eye problem	24	57.1	18	42.9
Refractive error	20	37.7	33	62.3
Dry eye and red eye	7	70.0	3	30.0
Glaucoma	1	100.0	0	0.0
Total	55	48.7	58	51.3

The data highlights the distribution of eye conditions based on work duration, categorized as less than 5 years and more than 5 years. Cataracts are equally distributed (50.0%), showing no variation by work duration. Corneal scars are more common in those with over 5 years of experience (66.7%) compared to less than 5 years (33.3%), suggesting

prolonged exposure to risks. A higher percentage of individuals with less than 5 years of experience reported no eye problems (57.1%) compared to those with over 5 years (42.9%), indicating a potential link between longer work duration and eye issues.

Refractive errors are more prevalent in individuals with over 5 years of experience (62.3%) than those with less (37.7%), possibly due to accumulated strain. Dry and red eyes are more frequent among those with less than 5 years of experience (70.0%) than those with more (30.0%), reflecting adaptation differences. Glaucoma was observed in one individual with less than 5 years of experience (100.0%), though the small sample size limits interpretation. Overall, cases are nearly evenly split between the groups (48.7% vs. 51.3%), suggesting work duration may not significantly affect overall prevalence but may influence specific conditions.

Discussion

The study revealed that 36.7% of respondents reported eye problems, with refractive errors being the most common (46.9%). This high prevalence aligns with findings from Joshi et al. (2011), which indicated that prolonged screen exposure and poor working conditions significantly contribute to visual impairments among industrial workers. These findings align with global trends where refractive errors are prevalent among working-age populations (Yekta et al., 2022). The high incidence of refractive errors emphasizes the need for regular eye examinations and access to corrective eyewear to enhance workers' productivity and quality of life. In contrast, lower rates of cataracts (3.5%) and glaucoma (0.9%) were observed in this study compared to other regions where these conditions are more prevalent due to aging populations and inadequate preventive care.

The analysis revealed that refractive errors were most common among Janajati workers (31 cases), while glaucoma was exclusively reported among Dalit respondents. This finding reflects existing literature that shows marginalized communities often face greater health risks due to limited access to healthcare resources, which is evident in the higher incidence of glaucoma among Dalits in this study (Yuan et al., 2022). This disparity may suggest potential genetic predispositions or environmental factors that influence eye health across different caste groups. Previous studies have shown that genetic factors can significantly affect ocular health, with specific populations being more susceptible to conditions like refractive errors and cataracts due to hereditary traits (Zhang et al., 2021). Moreover, environmental influences, such as access to healthcare and exposure to occupational hazards, cannot be overlooked. For instance, Janajati communities may have different occupational exposures that could contribute to a higher incidence of refractive errors, particularly in settings where visual demands are high or protective measures are

lacking. Additionally, gender differences were notable; males exhibited higher rates of dry eye conditions and cataracts than females, which may be because men were found to perform more physically demanding work (Campos-Serna et al., 2013). In contrast, women often occupy roles that may not involve such risks but can still face unique challenges related to eye health, such as increased screen time due to administrative tasks or caregiving responsibilities (Siddiqui et al., 2020). These disparities are consistent with previous findings suggesting that males are more likely to experience severe eye conditions due to occupational exposures (Joshi et al., 2011).

The relationship between environmental factors and ocular health is supported by studies indicating that exposure to noise and dust can exacerbate eye problems (Mandell et al., 2020). In this study, workers in noisy environments reported the highest rates of refractive errors, suggesting a direct correlation between occupational exposure and eye health outcomes. Long-term exposure to hazardous work environments has been shown to increase the risk of developing chronic ocular conditions, aligning with findings that longer employment duration correlates with higher rates of refractive errors (Yuan et al., 2022).

Likewise, the findings indicate a concerning prevalence of eye-related issues among workers, particularly refractive errors, dry eyes, and red eyes. These conditions can significantly impact workers' productivity and overall well-being. The extended working duration of most participants—over five years—suggests a cumulative exposure to adverse environmental conditions, highlighting the importance of proactive OSH measures (Shrestha et al., 2020). Despite the government's efforts to establish OSH standards, including permissible exposure limits for noise and recommended illumination levels for workplaces, the implementation remains inadequate. Many workers lack knowledge of these standards and do not utilize protective measures. This gap in awareness is a critical barrier to improving workplace safety and health (Shrestha et al., 2020). Specifically, in our study, regular screening is crucial for clients to detect and correct refractive defects early, as Worku et al. (2023) suggested. Government and industry stakeholders must enhance education and training programs focused on OSH standards to ensure workers understand their rights and the necessary safety practices.

Conclusion

This study highlights critical findings regarding occupational eye-related problems in the workers of Nepal's Patan industrial area. The alignment of these results with existing literature underscores the need for targeted interventions addressing socio-demographic disparities and occupational hazards. By focusing on preventive measures such as regular

eye examinations and educational initiatives tailored to specific communities, we can improve ocular health outcomes among industrial workers. This study emphasizes the critical need for improved OSH measures in developing countries, particularly regarding sensory health risks. The findings reveal a high prevalence of eye problems, such as refractive errors and dry eyes, among workers in the Patan Industrial Area, exacerbated by exposure to noise, chemicals, and inadequate safety practices. Addressing these issues through better OSH standards, enforcement of regulations, and worker education can significantly reduce occupational health risks and improve workers' quality of life. Additionally, gender and caste disparities in health outcomes indicate that tailored interventions are necessary. Through OSH initiatives, organizations can improve workplace safety, worker productivity, satisfaction, and public health.

Authors' Contributions

AA conceptualized the study and carried out the fieldwork, while BA supported the literature review and publication procedures. RKC, KK, and AKC edited and finalized the manuscript, with all authors providing final approval for publication.

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