ORIGINAL ARTICLE

Factors Causing Ocular Injuries among Workers in Construction Industry in Malaysia

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ABSTRACT

Introduction: Safety establishments at the workplace play a vital part in preventing ocular injuries in construction industries. Ocular injuries worsens the quality of life of workers, leading to economic loss. The arising of ocular injuries at emergency departments trigger a public health concern in Malaysia. This study aimed to investigate the factors causing ocular injuries among construction workers in Selangor, Malaysia. **Methods:** A cross-sectional study was conducted on construction workers in Klang Valley, Malaysia. A validated questionnaire evaluated factors consisting of environmental, behaviour and practice domains (α= 0.70 – 0.90) and Reichert Portable Slit Lamp assessed ocular injuries. **Results:** A total of 385 workers aged 18 to 65 years old completed the study. The prevalence of ocular injuries was 66.20% (n=255 eyes) which includes foreign body injuries (28.20%), subconjunctival haemorrhage (9.20%), corneal haze (4.75%), laceration (1.78%), corneal burn (1.18%) and traumatic cataract (0.29%). Environmental hazards such as dust 70.40% (n=271, p=0.00), chemical 75.80% (n= 292, p=0.00), heat 68.10% (n=262, p=0.00), equipment 60.5% (n=233, p=0.00), fall 54.80% (n=211, p=0.00) and limited working space 52.70% (n=203, p=0.00) significantly contributed to the ocular injuries. However, behaviour and awareness did not contribute significantly to ocular injuries (p<0.05). **Conclusion:** This study shows high prevalence of ocular injuries among construction workers in Klang Valley. The main factors causing ocular injuries are environmental factors. Thus, safety assessments including usage of PPE, training and closed monitoring are required to improve the eye safety and health at the construction sites.

Keywords: Ocular injuries, Environmental, Behaviour, Awareness

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INTRODUCTION

The surroundings in the workplace plays a vital part in producing a safe working environment at the construction sites. High exposure to a hazardous environment may impact a worker's wellbeing, health status and performance at the workplace (1). The construction industries are amongst the most physically challenging and hazardous environment for the workers (2) that can potentially cause ocular injuries. The eye injuries can cause drastic effects to a worker which led to visual impairment or even blindness (3).

In Malaysia, ocular injuries among construction workers are becoming an intensifying concern due to increasing numbers of ophthalmic emergencies at the Emergencies Department. Study has shown that majority of the workers with ocular injuries were in the construction industry (4). At the same time, these workers are exposed to all kinds of hazards in the construction sites. Manual handling, tools, small areas, work handled from high heights, excavations, irregular working hours and exposed to different weather conditions are among environmental hazards exposed the workers (5). Behavioural factors such as the lack of awareness or knowledge of the hazards at work (6) contributed to health consequences 10-20 times higher in economically developing countries than those in developed countries (7).

Moreover, poor compliance towards to personal protective eyewear (PPE) (8), limited understanding on the usage of the equipment, prolong working hours, lack of training and insufficient practice awareness among the construction workers were common (9). With the agreement to work in this exploitative condition (10), with minimal protection (11) and lack of adequate training during their probation phase (5). This can cause

a build-up of work stress (12) as they are unaware of what they are expected to do (13) with a lack of practice awareness (14) leading to adverse events. This may potentially harm the construction workers, causing injuries.

However, attempts to determine on whether these hazards could potentially cause ocular injuries, leading to deterioration of visual acuity were minimal. Many studies were not comprehensive in determining the contributory factors causing the ocular injuries (15). Hence, it is imperative to find the root causes so that safety measures can be done to avoid or prevent the occurrence of the ocular injuries (3). This study aimed to determine the causing factors of ocular injuries among construction workers in Klang Valley, Malaysia.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted using purposive sampling technique on the construction workers in Klang Valley from 1st June 2018 to 28th February 2019. A questionnaire was developed and validated comprises of three domains, the environmental factors (α=0.70), behavioural factors (α=0.90) and the practice awareness (α=0.77). The ocular health status was evaluated by a qualified Optometrist (researcher) using the hand-held slit lamp (Reichert Portable Slit Lamp) and the visual acuity was done by using Baily-Lovie Chart.

Inclusion Criteria

The age range was classified in terms of employment age, and those in the age range of 18-65 years, and have been working at the site for more than five months were selected into this study. A consent form was obtained before the questionnaire and ocular examinations conducted. The participants voluntarily agreed to participate in the study and were allowed to withdraw at any time.

Exclusion Criteria

Participants who are not construction site workers and suffering from any systemic disease such as diabetes mellitus, hypertension or atherosclerosis were also excluded from the study.

Sampling Frame and Sample Size

For the sample size calculation, a sample size was decided based on scientific table guidelines given by Krejcie and Morgan (1970). The sample size calculated to establish representativeness based on the population of construction workers in Malaysia beyond 100000 was 384.

Data Collection

Data was collected from six construction sites in Klang Valley, consisting of 3 construction sites from Kuala Lumpur, 2 from Balakong and 1 from Ara Damansara. The letter approval to enter the site was obtained from the companies and list of the participants was provided by the site supervisor duty at the construction sites. The supervisor determined the individual worker to be examined on the date and time agreed for the researcher to come and conduct the study. Ethical approval to conduct this study was obtained from Management and Science University (MSU-RMC-02/FR01/02/L1/006). A consent form was distributed to the participants prior to the examinations. The participant will be given a questionnaire to be completed followed by ocular assessment. The researcher will conduct the interview if the participants have the problems to answer the questionnaire.

Data Analysis

Descriptive statistics were used for general presentation in this study. All categorical data were analysed using Chi-square, to compare the environmental factors, behavior and practice awareness to the occurrence of ocular injuries, and a non-parametric statistic was done. All statistical analyses were conducted using SPSS software version 24.

RESULTS

Characteristics of the Construction Workers

There were 384 participants (Local, 32; International, 352) completed the study. Males were the highest number of workers at the construction site (98.20%, n=378). Foreign workers was higher 91.70% (n=353) compared to local workers 8.30% (n=32) working at the construction sites. The workers from Bangladesh were the highest number of participants with 74.20% (n=285) followed by Indonesia (9.64%, n=37), Malaysia (8.33%, n=32), Pakistan (4.17%, n=16), Myanmar (3.13%, n=12) and Nepal (0.52%, n=2) respectively. Many of the participants came from the age group between 26 to 44 years old. The age group between 26 to 34 was the highest with 30.00% (n=238) followed by 35-44 years old (12.50% (n=96), below 25 years old was 4.20% (n=32), 45 to 54 years old was 2.10% (n=16) and 55 -64 years old was 0.40% (n=3) respectively. Table I shows detailed characteristics of the participants.

Prevalence of Ocular Injuries

The prevalence of ocular injuries was high at 66.20% (n=255) followed the participants who were diagnosed with pterygium (54.60%, n=184 eyes), foreign body (28.20%, n=95 eyes), subconjunctival haemmorhage (9.20%, n=31 eyes), corneal haze (4.80%, n=16 eyes), laceration (1.80%, n=6 eyes), corneal burn (1.20%, n=4 eyes), and traumatic cataract (0.30%, n=1 eyes) respectively. Table II explain types of ocular injuries found in this study.

Factors contributing to Ocular Injuries

This study revealed that environmental hazards such as dust χ^2 (1, N=271)=177.92, p<0.05), chemical χ^2 (1,

Table I: Characteristics of the participants (n=385)

Description	n (%)
Gender	
Male	378 (98.20)
Female	7 (1.80)
Worker	
Local workers	32 (8.30)
Foreign workers	353 (91.70)
Age Range	
<25 yo	32 (4.20)
26-34 yo	238 (30.90)
35-44 yo	96 (12.50)
45-54 yo	16 (2.10)
55-64 yo	3 (0.40)
Nationality	
Malaysian	32 (8.30)
Bangladeshi	285 (74.20)
Indonesian	37 (9.60)
Pakistan	16 (4.20)
Myanmar	12 (3.10)
Nepal	2 (0.50)

Table II: Type of Ocular Injuries and Comparison by Nationality

Variables	n (%)	Nationality		p Value
		χ^2	df	
Overal Ocular Injuries	255 (66.20%) (42.90%)			
Ocular Injuries (OD)		18.54	6	0.00*
Pterygium	10 (31.30%)	75 (21.20%)		
Foreign body	6 (18.80%)	44 (12.50%)		
Subconjunctival Hemmorhage	1 (3.10%)	19 (5.40%)		
Corneal haze	0 (0.00%)	11 (3.90%)		
Laceration	2 (6.30%)	1 (0.30%)		
Corneal burn	0 (0.00%)	3 (0.80%)		
Ocular Injuries (OS)		26.74	6	0.00*
Pterygium	10 (31.30%)	89 (25.20%)		
Foreign body	4 (12.50%)	41 (11.60%)		
Subconjunctival Hemmorhage	2 (6.30%)	9 (2.50%)		
Corneal haze	1 (3.10%)	4 (1.10%)		
Laceration	0 (0.00%)	3 (0.80%)		
Corneal burn	1 (3.10%)	0 (0.00%)		
Traumatic cataract	1 (3.10%)	0 (0.00%)		

N=292)=71.56, p<0.05), excessive heat χ^2 (1, N=262) = 158.48, p<0.05), equipment not ergonomic χ^2 (1, N=233)=11.94, p<0.05), fall χ^2 (1, N=211)=12.37, p<0.05) and limitation of working space χ^2 (1, N=203) =9.86, p<0.05) significantly contributed to the occurrence of ocular injuries. The behavioral factors showed that knowledge χ^2 (3, N=303)=1.80, p>0.05), training χ^2 (3, N=267)=1.56, p>0.05) and compliancy χ^2 (3,N=240)=2.10, p>0.05 were low among the construction workers. The practice awareness towards their work stress χ^2 (3, N=260)= 5.64, p>0.05), safety χ^2 (4, N=276)=6.87, p>0.05 and exposure χ^2 (4, N=253)=5.03, p>0.05 were also considered low. Table III show the factors causing ocular injuries among the construction workers.

Table III: Factors causing Ocular Injuries among participants

	n (%)	χ^2	df	p Value
Environment				
Dust	271 (70.40%)	177.92	6	0.00*
Chemical	292 (75.80%)	71.56	6	0.00*
Excessive Heat	262 (68.10%)	158.48	6	0.00*
Equipment	233 (60.50%)	11.94	6	0.00*
Fall	211 (54.80%)	12.37	6	0.00*
Limited Space	203 (52.70%)	9.85	6	0.00*
Behaviour				
Poor Knowledge	303 (78.70%)	1.80	3	0.61*
Lack Training	267 (69.30%)	1.55	3	0.75*
Low Compliancy	240 (62.30%)	2.01	3	0.56*
Practice Awareness				
Work Stress	260 (67.50%)	5.64	3	0.96*
Safety	276 (71.70%)	6.87	3	0.39*
Exposure	253 (65.70%)	5.03	3	0.14*

DISCUSSION

When comparing genders, males (n=378, 98.20%) were dominant in the construction industry. It is common to see men dominating in the construction industry due to the masculinity nature of their job, which requires them to be work for long hours in a physical and challenging jobs at construction sites (16). Women's participation in the construction industry are minimal as their main job is to assist the male workers in lifting cement bags and other materials, with minimal income (11).

With regards to the nationality of the construction workers, it was found that the Bangladeshi's (n=285, 74.22%) were prevalent in the construction industry. The reason why Bangladeshi's are over populated in the construction industry compared to local Malaysians and other nationalities is because the labour cost is cheap. Many of the business owners could not afford to hire Malaysians because of their higher demand in salary and demands of workplace facilities compared to migrant workers (17). It is also relatively common to find many welders over-represented in the construction industry come from Bangladesh (18).

Majority of the construction workers were exposed to environmental hazards such as construction dust (n=271, 70.40%), chemical (n=292, 75.80%), excessive heat (n=262, 68.10%), equipment (n=233, 60.50%),

fall (n=211, 54.80%) and limitation of working space (n=203, 52.70%). These factors contributed significantly to the occurrence of ocular injuries. Many studies showed similarities with this study in terms of the presence of environmental hazards in construction industry especially in developing countries (19-22) such as Thailand (19), South Africa (23), Bangladesh (24). Dust exposure (25-26), chemical exposure (27), excessive heat (11), fall (28-31), equipment not ergonomic (29-32) and limitation of working space (30-33) were amongst the common environmental hazards found at the construction sites.

Behaviors of the workers tends to affect the health status of the workers (31-32). However, in this study, the behavior does not significantly affect the occurrence of ocular injuries among construction workers. Despite behaviors no longer playing an important role to ocular injuries, majority of the construction workers showed poor knowledge (n=303, 78.70%), inadequate training (n=267, 69.30%) and low compliance (n=240, 62.30%) towards wearing safety eyewear. Individuals' behavior at work may possibly cause unfavourable incidents (33-35). However, it may actually depend on the organization itself due to poor implementation of safety policies. Construction companies often blamed workers, accusing them for everything that has occurred. Perhaps the workers' behavior do affect the injuries to a certain extent. Nevertheless, the constant blaming on workers indicates the ignorance of the organizations responsibility to provide necessary safety eye measures at the workplace. When organizations view the smaller picture, by pointing fingers to construction workers, additional errors are made due to the unsuitable adjustments by the managing team, leading to more injuries and more delays with increased cost (36-39). Hence, eye safety measures and monitoring should be done. An onsite surveillance should be placed by tracking movements of the construction workers doing their regular job that is requiring equipments or devices. In addition to that, the interview-based should also be considered as an effective method. These methods will reduce or prevent injuries from occurring (37-40).

The practice awareness among the construction workers were low in this study. While performing their daily routine at work, a large number of the workers seemed to have low practice awareness. The construction workers seemed be having work stress (n=260, 67.50%), low safety awareness (n=276, 71.70%) and low exposure (n=253, 65.70%) to work at the construction sites. Although studies indicate that the construction workers' practice awareness could drastically impact the workers' visual status (38-39; 41), it is necessary to put a stop in pointing fingers at the construction workers (31). Blaming the workers' behavior shows no benefit as ocular injuries continue to occur (40-41). However, facilitating eye care professionals to ensure regular eye safety assessments, training on eye safety and health and strict enforcement of eye safety regulation will help to improve eye safety at the workplace.

CONCLUSION

Despite having regulations and policies in place, there is a lack of proper implementation and enforcement on safety measures in organizations. Only when organizations stop neglecting and put these policies into practice, then there will be compliance amongst workers. Hence, providing regular eye safety assessment and monitoring at the construction sites is a definite requirement. When this action is taken into consideration, a deeper understanding towards the construction worker's ocular health is obtained and therefore, appropriate steps to prevent injuries will be taken by every individual worker as they become more aware of hazards at the construction sites.

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