

KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS PERSONAL PROTECTIVE EQUIPMENT USE AMONG STEEL INDUSTRY WORKERS IN THAILAND

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ABSTRACT:

Background: Steel industry workers have been involved in several hazards such as heat, noise and some chemicals because of a complexity of operation process. Personal protective equipment (PPE) plays its important role in protection and prevention workers from exposing to those hazards and workers' health. Therefore, current study aimed to access levels of knowledge, attitude and practice on personal protective equipment use and to examine an association among those levels among steel workers.

Methods: A cross-sectional study was conducted among 336 workers from scrap preparation and rolling mill department in a steel industry. Face to face interview was conducted for each worker to complete questionnaire. Bivariate analysis was applied by using Chi-square test.

Results: Average age (\pm standard deviation) of participants was 36.58 (\pm 9.47) years. Most of them had worked in the steel industry less than 5 years. Most of work hazards reported by workers were noise and dust 100%. Percentages of the practice of workers 39.9% that using PPE to protect themselves from their work, 81.2% of the workers using helmet, 87.95% of the workers using safety shoes and 86.17% of the workers using boots. Around 50% of workers reported as always use ear plug and ear muff. Sixty-two percent of participants were classified their knowledge regarding PPE use in good level. Attitude and practice towards PPE use among majority of workers were also sorted into moderate levels. Knowledge and attitude levels of those workers were associated with their practice level (p -value <0.001)

Conclusion: An association among knowledge, attitude and practice levels provided solid evidences to strengthen an encouragement of PPE use among steel workers by providing an innovative intervention.

Keywords: Steel industry worker, Personal protective equipment use, Thailand

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INTRODUCTION

Steel industry is a dangerous industry which workers experience high occupational risk. A complexity of production process in steel industry combined with unsafe working environments including physical, chemical, biological and psychosocial hazards was prone to accidents, injuring and occupational mobility [1]. In 2013, Social security office of Thailand reported that around 20,000 metal industries employees had

suffered from occupational injury and disease. Although some establishments have well plan for structure engineering design, there are some functional limitations which could not be solved by the design. Design facilitates to help for controlling and preventing harm to workers, however personal protective equipment also needs to ensure compliance with maximum safe.

Regarding steel production process, scrap preparation and rolling mill process are considered as potential high risk of occupational injury. Scrap preparation provide various scrap gathered to perform sorting, cleaning and small size to be

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smaller in order to prepare for melting iron. Rolling mill is a process of steel rebar into different sizes. The iron rolled out a long coil by coiler and the steel coil. Workers have to stretch iron to a straight line. Working characteristic in both process require high personal protective gears for injury protection [1].

Personal protective equipment (PPE) designed to reduce the risks associated with industrial injuries. In addition, industrial employees are required to provide PPE and training for their workers to help reduce the risk of worker injuries and chemical exposure [2, 3]. Encouraging PPE use among steel workers depends on their appropriate attitude towards the health risks, which associated with knowledge about the danger and harmful effects of their work characteristic [4].

Few studies had been focused on a relationship between knowledge, attitude and practice related to PPE use among steel industry workers in Thailand. Therefore, this study aimed to 1) assess the levels of knowledge, attitude and practice on personal protective equipment use among of steel industry workers and 2) examine associations of knowledge and attitude with practice for personal protective equipment use among steel industry workers.

MATERIALS AND METHOD

Questionnaire

Questionnaire was developed from previous study [5]. The questionnaire was composed of socio-demographic, job characteristic and knowledge attitude and practice regarding personal protective equipment use. Knowledge was focused on workers' understanding about hazards in their working process and properties of each gears. Total scores were classified into 3 levels using bloom's cut point which were good knowledge (80-100% of total score; 13 - 16 scores), moderate knowledge (60 - 80%; 10 - 12 scores) and poor knowledge (< 60%; 0 - 9 scores). Attitude regarding PPE use was tested workers' perception of the use. The 5-likert scale was used to estimate for each item. Total scores of attitude were grouped into 3 levels by percentile. Total scores more than 75th percentile (43-60 scores), 25th - 75th percentile (38-42 scores), and less than 25th percentile (0-37 scores) were good, moderate and poor attitude respectively. The part of practice was constructed based on a basic requirement of PPE in the industry. Each PPE item were checkboxes for the answer of never (0 point), occasionally (1 point) and always (2 points). Total scores of attitude were grouped into 3 levels by

percentile. Total scores more than 75th percentile (27 - 38 scores), 25th - 75th percentile (21 - 26 scores), and less than 25th percentile (0 - 20 scores) were good, moderate and poor practices respectively.

The survey

A cross-sectional study was conducted during May - June 2016. All workers whom met inclusion criteria in scrap preparation department and rolling mill department in steel industry were participated in this study. Scrap preparation department and rolling mill department were chosen because both departments showed a higher rate of accidents than other departments. Data were gathered from the workers by a face-to-face confidential interview at the worksite by researcher and well-trained researcher assistants who had work experience in safety and environmental. Totally, 336 workers were completed interview.

Statistical analysis

The licensed SPSS software for windows version 16 was used in analysis. Frequency tables of demographic characteristics, knowledge, attitudes and practices were tabulated. Normality test was performed before analysis inferential statistic. Chi square test was applied to test association between knowledge and attitude, knowledge and practice, and attitude and practice. In this analysis, p-value of less than 0.05 and 0.01 were considered to be statistical significant.

Ethical consideration

This study was approved by the Ethic Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University with the certified code COA No.094/2559.

RESULTS

From 350 participated steel industry workers, 167 of them worked in scrap preparation department and 169 of them were in rolling mill department. The majority of workers were male (95.8%). The mean age of workers was 36.58 years with a standard deviation of 9.478. The age ranged from 22 to 53 years. Table 1 shows mean (\pm standard deviation) of work experience of workers was 9.18 (\pm 7.35). Most of them (53.9%) had work experience range from 1 to 5 years. Around ninety percent of workers work for 8 hours in each day.

Distribution of knowledge regarding using personal protective equipment of the workers

Table 1 Job characteristics and working experience of steel workers

Characteristics	Number (n= 336)	Percentage (%)
Department		
Scrap preparation	167	49.7
Rolling mill	169	50.3
Work experience		
1 - 5	181	53.9
6 - 14	70	20.8
15 - 26	85	25.3
Mean = 9.1 SD = 7.349		
Median = 5.00		
Average working time per day		
8 hr.	308	91.7
9 hr.	28	8.3

Table 2 Knowledge, attitude and practice regarding personal protective equipment use among steel workers

	n	Percentage (%)
Knowledge level		
Good	209	62.2
Moderate	113	33.6
Poor	14	4.2
Attitude level		
Good	78	23.2
Moderate	161	47.9
Poor	97	28.9
Practice level		
Good	72	21.4
Moderate	159	47.3
Poor	105	31.2

Table 3 Association between knowledge, attitudes and practice levels among steel industrial workers

Factor	Practice level			Chi-square χ^2	p-value
	Low (%)	Moderate (%)	High (%)		
Knowledge level					
Low	11 (3.3)	1 (0.3)	2 (0.6)	116.308*	<0.001
Moderate	68 (20.2)	34 (10.1)	11 (3.3)		
High	28 (8.3)	60 (17.9)	121 (36.0)		
Attitude level					
Low	43 (12.8)	6 (1.8)	48 (14.3)	1.283	<0.001
Moderate	50 (14.9)	29 (8.6)	82 (24.4)		
High	14 (4.2)	60 (17.9)	4 (1.2)		

*Fisher's Exact Test

Table 4 Association between knowledge and attitudes levels among steel industrial workers

Factor	Attitude level			Chi-square χ^2	p-value
	Low (%)	Moderate (%)	High (%)		
Knowledge level					
Low	3 (0.9)	1 (0.3)	10 (3.0)	25.445*	<0.001
Moderate	42(12.5)	51(47.6)	20 (11.0)		
High	52(15.5)	109 (32.4)	48 (14.3)		

*Fisher's Exact Test

showed that 62.2% of subjects had good knowledge while only 4.2% had poor knowledge. For attitude level regarding PPE use, most of workers (47.9%) had moderate level. Twenty-three percent of them had good attitude level. Some worker (11.9%) agreed that they could work without personal protective equipment. However, some of them (17.3%) thought that PPE is not enough for self-protection from hazards. Around 15% of workers agreed that PPE was waste of money. Majority of workers had moderate practice level. 21.4% and 31.2% of them had good and poor practice as shown in Table 2. Most of workers had reported as “always” wearing helmet (81.2%) and safety shoe (85.4%) while half of them always wore safety glasses and ear plug/ear muff. However, ten percent of workers had never worn safety shoe.

Table 3 presented association between levels of knowledge, attitudes and practices regarding using personal protective equipment use among steel workers. Results showed that workers’ practice was associated with their knowledge and attitude regarding PPE use (p -value <0.001). Additionally, knowledge was statistically significant associated with workers’ attitude (p -value <0.001) (Table 4).

DISCUSSION

Steel industry involves various processes. Scrap preparation and rolling mill process were considered as the most dangerous sectors because of higher accident incidence rate. Regarding to steel industry process, workers are able to expose to physical and chemical hazards in scarp preparation and rolling mill process. During preparation of steel for melting process, workers prepare iron through sorting, cleaning and cutting iron to be smaller size. Comparing with other processes in steel work, scarp preparation and rolling mill seems to be man-made procedure. Therefore, unawareness of workers leads to several health consequences.

Finding from this study found that most of steel workers had high knowledge regarding PPE use whereas their attitude and practice were found in moderate level. Additionally, level of practice on using personal protective equipment was significant association with knowledge and attitude. Several KAP studies were conducted with different categories of workers. However, current study was specifically KAP study to the high risk workers in steel workers.

Regarding to the results, steel workers had good knowledge regarding PPE use because of a training

program provided by industry’s occupational health office. According to Thailand revises laws concerning health and safety at work (Part II) – The Safety, Health and Workplace Act (2011), all workers have to be trained how to use PPE before starting their job. Consequently, results from current suggested that training might not be effectiveness because training could not drive workers’ attitude and practice. Around 40 percent of this study neutrally agreed to work without PPE. Furthermore, most of worker (72.9%) neutral agreed that only PPE did not enough for self-protection. For PPE use among steel workers in this study, only foot protection of basic PPE (head, foot and face protection) had been reported as never use. However, safety shoes are considered as an important protective gear for steel worker. Additionally, half of workers reported as sometimes use for face protection. Yu and colleagues showed that safe practice did not rely on workers’ knowledge and attitude but was depended on safety precaution and supported by information from supervisors [5]. An availability of PPE in the industry was another influencing factors on workers’ practice. A study of salt workers in India pointed out that workers PPE use level was low because the devices was not provided by the manufacturers [6]. There are several suggestions and recommendations to improve workers’ knowledge, attitude and practice. If workers receive more information about hazards of steel industry, they may be aware of their practice on using personal protective equipment. Workers’ family, colleague, supervisor or manager may play as an importance role for encouraging PPE use.

CONCLUSION

The results of this study found that most of steel workers had good knowledge whereas their attitude was moderate. Concerning on their practice, study showed that steel workers practice was statistically significant with their attitude and practice. However, practice regarding PPE use among steel workers was fallen into moderate level. Therefore, steel factories should be considered to strengthen an encouragement of PPE use among workers by providing an innovative intervention. An increasing knowledge might reflect workers’ attitude and practice regarding PPE use.

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