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AN ANALYSIS OF THE FACTOR AFFECTING SUBSTANDARD PRACTICE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) USAGE IN CEMENT INDUSTRY MAINTENANCE WORKERS

Ike Agustin Rachmawati[1], Y. Denny Ardyanto[2], Tjipto Suwandi[2]

[1]Departement of Occupational Health and Safety, Faculty of Public Health, Airlangga University
[2]Department of Occupational Health and Safety, Faculty of Public Health, Airlangga University

*Corresponding author: Ike Agustin Rachmawati, Surabaya, ikeagustin99@gmail.com

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ABSTRACT

Background: Repair and maintenance work of machine has high risk and hazard that could potentially lead to work accident. The use of PPE is the final hazard control effort that serves to reduce the severity of work accident5. This study analyzed the effect of age, self-efficacy, PPE training, and PPE availability on substandard practice of PPE usage in maintenance workers.

Materials and Methods: This study was an observational study with cross-sectional design. Subject of the study amounted to 54 maintenance workers. The independent variables were consisted of age, self-efficacy, PPE training, and PPE availability. The dependent variable was substandard practice of PPE usage. Data collection techniques used questionnaire to find out age, self-efficacy, PPE training, PPE availability, and observation to know substandard practice of PPE usage.

Result: The p value of age = 0.021, the p value of self-efficacy = 0.089, the p value of PPE training = 0.000, and the p value of PPE availability = 0.345. Based on multiple logistic regression test, if ($p < 0.05$) hence it has a significant influence to substandard practice of PPE usage.

Conclusion: self-efficacy and PPE availability have no effect on substandard practice of PPE usage. Age and PPE training significantly affect the substandard practice of PPE usage in maintenance workers

Keywords: age, self-efficacy, PPE training, substandard practice.

1.0 Introduction

Work accident is an undesirable event that can harm people, causing damage to property or loss on the process[1]. Work accident is the implication of causal sequences caused directly by unsafe behavior. According to the International Loss Control Institute (ILCI), work accident is caused early by lack of management control resulting in the emergence of the basic causes (personal factor and job factor), lead to the emergence of a direct cause of substandard practice and condition [2]. Bird and Germain (1992) revealed that the direct cause is dominated by unsafe behavior called substandard practice. This is reinforced by the Pennsylvania Department of Labor Industry (2011) that work accidents are caused most by unsafe behavior, i.e. 80 out of 100 work accidents occurred[3].

Work accident brings harm to the workplace, costs, time, productivity, and loss of life[4]. The magnitude of the loss caused by accident encourages company to make an effort to suppress and control all of the potential risk and hazard in the workplace. Personal protective equipment is a final hazard control effort which is technically useful for reducing the severity of possible work accident[5]. The great advantage of PPE will not be optimal if the worker fails to use PPE properly and not in accordance with the safe working procedure standard (substandard practice use of PPE). The basic factors that lead the officer for not using PPE properly at work including lack of policy, training, facility, and personal aspect of the worker such as age, motivation, and self-efficacy (Agustine, 2015)[12]. Basically, the emergence of substandard practice use of PPE can be studied and changed by identifying and controlling the management control factor as the main causal factor and personal factor as well as job factor as the basic causes of PPE usage behavior[2].

Worker behavior is the direct cause of work accident that must be controlled. PPE usage behavior on officer is not formed just like that. PPE should be provided by the company and used by officer at work, in accordance with appropriate procedure according to the coaching or training and with continuous supervision so that the use of PPE becomes optimal to reduce the severity of work accident[11].

2.0 Materials and Methods

This study was an observational analytical study. The design of this study used cross sectional study, we conducted observation on independent and dependent variable in the same time. The population in this study was all maintenance officers. The sampling technique was determined by simple random sampling. The sample in this study were 54 people. Data collection was conducted in March 2018.

The independent variables in this study were personal factors (age and self-efficacy) and job factors (PPE training and PPE availability). While the dependent variable was substandard practice of PPE usage in maintenance workers. Primary data collection was done by using questionnaire and observation of PPE usage. Secondary data was obtained through document and record which documented by the company's Health and Safety Department. Data processing is presented in the frequency distribution table. Overall data were analyzed descriptively. The hypothesis testing was using simple logistic regression statistical test.

3.0 Result

3.1 Frequency distribution of study variables

Table 1 Frequency distribution of study variables

Study Variables	Category	N	%
Age	<33 years old	19	35.2
	≥ 33 years old	35	64.8
	Total	**54**	**100**
Self-Efficacy	Low	19	35.2
	High	35	64.8
	Total	**54**	**100**
PPE Training	Lack	18	33.3
	Good	36	66.7
	Total	**54**	**100**
PPE Availability	Not Fulfilled	10	18.5
	Fulfilled	44	81.5
	Total	**54**	**100**
Substandard practice of PPE usage	Standard	39	72.2
	Substandard	15	27.8
	Total	**54**	**100**

(Source: Primary Data of Cement Industry Maintenance Workers, 2018)

Data collection used questionnaire to obtain age, self-efficacy, PPE training, and PPE availability as well as substandard practice of PPE usage was measured through observation. Table 1 shows that the majority of maintenance workers aged ≥ 33 years old of 64.8%, have high self-efficacy of 64.8%, PPE training is good of 66.7% and PPE availability is fulfilled of 81.5%. A total of 27.8% maintenance workers do substandard practice of PPE usage.

3.2 Cross tabulation of age, self-efficacy, PPE training, and PPE availability on substandard practice of PPE usage

Table 2 The result of age, self-efficacy, PPE training, and PPE availability cross tabulation on substandard practice of PPE usage

Variables		Substandard Practice of PPE Usage				Total	
		Standard		Substandard			
		N	%	N	%	N	%
Age	< 33 years old	17	89.5	2	10.5	19	100
	≥ 33 years old	22	62.9	13	37.1	35	100
	Total	39	72.2	15	27.8	54	100
Self-Efficacy	Low	11	57.9	8	42.1	19	100
	High	28	80	7	20	35	100
	Total	39	72.2	15	27.8	54	100

PPE Training	Lack	6	33.3	12	66.7	18	100
	Good	33	91.7	3	8.3	36	100
	Total	39	72.2	15	27.8	54	100
PPE Availability	Not Fulfilled	6	60	4	40	10	100
	Fulfilled	33	75	11	25	44	100
	Total	39	72.2	15	27.8	54	100

Table 2 shows that the workers with age ≥ 33 years old performs substandard practice of PPE usage by 37.1%. Age becomes a consideration factor in providing work and task in the maintenance field. The younger workers tends to experience fewer accident than the older workers[5]. The workers with low self-efficacy of 42.1% do substandard practice of PPE usage. The workers who thinks that PPE training is lack about 66.7% do substandard practice of PPE usage. Training is one of the key component of any safety program, including the PPE program[6]. 40% of the workers stated that the PPE availability is not fulfilled and still do substandard practice of PPE usage. The availability of adequate PPE is one of the factors that support the formation of PPE usage behavior[7].

3.3 The influence of age, self-efficacy, PPE training, and PPE availability on substandard practice of PPE usage

Table 3 *Multiple Logistic Regression* (MLR) Candidate

Variables	**p-*value***	**Anotation**	***Prevalence Ratio* (PR)**
Age	0.021	MLR Candidate	3.7
Self-Efficacy	0.089	-	-
PPE Training	0.000	MLR Candidate	8.07
PPE Availability	0.345	-	-

The result of the study was tested statistically using simple logistic regression test with enter method to discover the effect of age, self-efficacy, PPE training, and PPE availability on substandard practice of PPE usage in cement industry maintenance workers. Table 3 shows that age and PPE training variables affecting the substandard practice of PPE usage. Workers aged ≥ 33 years old are at risk in doing substandard practice of PPE usage 3.7 times greater than workers < 33 years old. Workers who declared PPE training is lack are at risk in doing substandard practice of PPE usage 8.07 times greater than those who stated that the PPE training is good.

4.0 Discussion

Age affects the substandard practice of PPE usage. The result of this study is supported by the result of Syahrozi's (2016) study that age has an effect on the PPE usage[16]. Azwar (2010) described the result of study by Kronick and Alwin that the younger age group is more receptive to persuasion than the older age group[8]. Persuasion in the form of verbal and nonverbal including the industry regulation regarding the obligation of PPE usage in the

workplace, PPE e-training, safety induction, life saving talk (LST) and safety sign which has been done by the company. Workers aged ≥ 33 years old may experience the reduction of reaction speed, physical, and mental capacity. In addition, workers aged ≥ 33 years old tend to have reduction of hazard and risk alertness and awareness so they are not realize about their substandard behavior. One of the basic causal factor that lead people to conduct substandard practice is physical and mental disability. One of the indicator is age[2].

Self-efficacy has no effect on substandard practice of PPE usage in maintenance workers. This study is in line with the study of Patrika (2012) that there is no correlation between self-efficacy with treatment seeking behavior in patient with breast cancer in Ibnu Sina Hospital[9]. Self-motivation and efficacy are an important part of behavior formation. Similar to the statement of Bandura (1997) that a person with high self-efficacy will be followed by high motivation to perform the expected action[10].

PPE training has a significant influence on substandard practice of PPE usage in maintenance workers. Purnamasari (2015) concluded that there is a significant correlation between Occupational Health and Safety training with substandard action on 1 and 2 machine maintenance workers at Power Plant Industry[11]. Previous study by Marion et. al (2004) stated that lack of training influences worker's awareness to use PPE even though they understand occupational hazard and is prone to work accident[13]. PPE training needs to be given by the company to all workers on a regular and ongoing basis to improve and increase the knowledge, skill, and behavior so that PPE training should be tailored to the specificity of work and worker needs.

The PPE availability does not affect the substandard practice of PPE usage in maintenance workers. Similar to Rakhmawati's (2017) study result, there is no correlation between PPE facility and compliance with PPE usage according to the standard operational procedure (SOP)[14]. Rengganis (2012) stated that although the company has provided free PPE but this is not enough to make the officers obedient and aware to use it while working[15]. Sufficient PPE facility if not followed by the appropriate use of standard PPE will increase the severity of work accident. Thus, in addition to providing the adequate PPE also needs to be followed by reinforcing which is strengthening the supervision of PPE usage.

5.0 Conclusion and recommendation

There is no influence of self-efficacy and PPE availability on substandard practice of PPE usage in maintenance workers at cement industry. There is an influence of age and PPE training with substandard practice of PPE usage in maintenance workers at cement industry. Suggestions given that among the workers can share the knowledge as supporter of PPE e-training to increase the awareness of PPE usage and need for a substandard practice reporting system that involves the active role of colleagues for workers to use standard PPE consistently. Suggestions given for the company that the management needs to increase the intensity of scheduled monitoring, to intensify the feedback (reward and punishment) system from the supervisor, and increase the PPE promotion effort in the workplace by poster or interactive activity.

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Declaration

I stated that I don't do any plagiarism in writing my thesis.

Author contribution

Author 1: Ike Agustin Rachmawati Author 2: Y. Denny Ardyanto, Author 3: Tjipto Suwandi

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