



## Analysis of the Obedience of Personal Protective Equipment Usage to Prevent Occupational Disease among Cosmetic Workers

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### Abstract

Cosmetic industry has a high risk of occupational diseases such as talcosis or respiratory disorders among the workers at PT X. Based on the preliminary study, respiratory disorders are indicated among the workers because of high level of dust powder from talc powder at the work place. Occupational diseases can be prevented such as by using correct and precise Personal Protective Equipment (PPE). Methods: The study aimed to determine the relationship between respiratory symptoms, knowledge, education, and job tenure with the obedience of PPE usage to prevent occupational disease because of talc powder among cosmetic division workers at PT X. The study used an analytical survey research method with a cross-sectional approach. The sample was 48 people using the Total Sampling technique. Statitiscal test using Chi-Square Test. Results: The result of the test showed there is a relationship between respiratory symptoms (p-value = 0,024) and knowledge (p-value = 0,006) variable with the obedience of PPE usage among workers (p-value = 0,006), to be found there is a respondece who has less knowledge regarding occupational safety and health is considered to have 18.3 times more risk of being disobedient in using PPE, while there is no relationship between education (p-value = 0,161) and job tenure (p-value = 1.000) with the obedience of PPE usage among cosmetic division workers at PT X. Conclusion: There is a relationship between respiratory symptoms and knowledge with the obedience of PPE usage among the workers, and it's recommended to company owner to provide training for the workers about the importance of PPE usage that mainly corrects and precisely, also doing supervision and daily checking on the workers before, during, and after work.

### Introduction

Cosmetic Products, according to the regulation of the Indonesian Ministry of Health number 1175/MenKes/PER/VIII/2010, are all ingredients that can be used outside the human body, such as skin, hair, nails, lips, or teeth that have functions to purify, protect, and take care of body parts (Ministry of Health of Republic of Indonesia, 2010). A raw material that is commonly popular in the cosmetic industry is talc powder. Talc powder has a soft white texture (Sinniah, 2011). Talc powder is a natural mineral composed of 31,7% magnesium oxide,

63,5% silica dioxide, and 4,8% water within a formula  $Mg_3Si_4O_{10}(OH)_2$  (Johnson, 2021). Talc is insoluble in water, cold acids, and alkalis (Fiueme et al., 2015).

According to an international cancer research agency, talc powder contains asbestos fiber carcinogenic to humans. However, there is no substantial evidence that all talcum powder used for face or skin powder contains asbestos fiber (Matina et al., 2011). The usage of talc powder as raw material in the cosmetic industry has an extended impact on workers' health which is closely related to occupational

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diseases such as lung disease or impaired lung due to long orders of talc powder dust (Yunus et al., 2020).

International health data from the International Labour Organization (ILO), every year there is more than 250 billion work accidents in the workspace, and more than 160 billion workers are ill because of high risk in the workspace. More than 1,2 billion workers die because of work injuries and disease (ILO, 2013). World Health Organization reports that 1,1 billion deaths were caused by occupational illness around the world, and 5% of that was respiratory disorder because of dust (WHO/ILO, 2016).

Exposure to the industrialization process can cause related occupational diseases (Darnton, 2017). Occupational diseases from talc powder dust can cause a higher risk of exposure to workers talcosis, talcosilicosis, talco-asbestosis, and pneumoconiosis. Inhalation of talc powder can cause fatality consequences (Fiume et al., 2015). Talc powder dust would line and dry the mucous membranes, cause bleeding, edema, and epital bronchial tubes, and block and disturb the lung's airways (Maros and Juniar, 2016). ILO declared that lung disease due to work-related most suffered lung disease restrictive is pneumoconiosis in the state, there is 30%-50% that suffer from it. Health disease cases from Central Java Health Office examination survey results in 2004 discovered 83,75% of formal workers and 95% of informal workers suffer from lung function disorder (ILO, 2016).

Occupational diseases can occur because there are factors, reasons, and consequences from the work environment. Occupational diseases can be prevented with protection held by company for the workers by providing a work environment that is safe and comfortable, suitable equipment, and personal protective equipment (PPE) that is suitable for the kind of work they do and meet the national or international standard that is safe, comfortable, and effective to protect the workers toward the risk that workers faced (Beyene Gebrezgiabher et al., 2019).

Although the company has taken preventive measures to protect workers from dangerous exposure, there is a behavior factor

from the workers that is often negligent when they work. A lack of knowledge and understanding about the importance of occupational safety and health can cause workers' behavior (Khan et al., 2015). An acknowledgment of PPE is an understanding of the stuff and thing related to protection equipment that workers will use during work and its influence on workers' behavior in using PPE entirely and correctly (Matina et al., 2011).

According to the study by Barizqi (2015), obedient workers have a piece of knowledge and awareness to protect themselves from hazards at work and behave safely in carrying out their work. Otherwise, the workers that do not obey will be inclined to make a mistake in every process work because they do not follow the standards and regulations enforced at the company

There is another essential parameter about the lack of knowledge, low stimulus in thinking, bad behavior, wrong understanding about unsafe behavior, and lowly of competition while working can be influenced by the educational level that someone has taken (Yaghoti et al., 2021). Based on that theory, change of behavior results from the mutual interaction obtained from the living environment and education environment. The higher the educational level that has been taken. Someone's behavior can lead to better results than others. This behavior can also change due to how long the workers have been in the work environment (Yunus et al., 2020).

The period or length at work can affect the health condition of the workers. Job tenure can be used to determine the duration of worker exposure to risk factors. In a polluted environment, the length of work would be affected by the long exposure the workers will get (Sadhra et al., 2020). The longer they work in such an environment, the more contamination exposure will be absorbed by the body, so the possibility of lung function disorder will get higher (Matina et al., 2011).

An initial survey was conducted in October 2022 with an observation and interview for preliminary studies. It was known that cosmetic's dust, especially talc powder, flew a lot in the workspace. The area that has a higher dust level is in the weighing process area,

which has a dust level of 0,983 mg/m<sup>3</sup> and the filling area with 0,5637 mg/m<sup>3</sup>. According to The Regulation of Minister of Labor Number 13 of 2011 on Physical Threshold Values and Chemical Factors in the Work Environment, the threshold value of dust level in the workspace is 2 mg/m<sup>3</sup> (Ministry of Labor of Republic of Indonesia, 2011). The dust level in the cosmetic division was rated high enough and had a higher risk of causing respiratory disorders to workers exposed to talcum dust for a long time (Kurth, 2019). Despite this number has not passed the threshold value, the company expected to provide preventive efforts so the workers would not get disturbed by the high dust level, which can cause respiratory disorders and other occupational diseases or work accidents (Balkhyour, 2019).

To prevent occupational diseases, the company has provided suitable equipment with safety standards and full PPE. The provided PPE is respiratory mask, non-medical mask, protective uniform, gloves, safety shoes, earplugs, and head cover. The company obliged the workers to obey Occupational Safety and Health (OSH) regulations applied contiguously with the system management occupational safety and health to prevent unwanted incidents such as work accidents or occupational diseases (Syron, 2019). Even though PPE is provided in order to avoid respiratory disorders because of cosmetic dust, workers still suffer respiratory disorders symptoms such as coughing, stuffy nose, itchy throat, eye irritation, and shortness of breath when working in the cosmetic division.

When observational activity is held, some workers are often negligent by putting off the respiratory mask or mask at the workspace while working because it's uncomfortable to wear for a long time. Employee working time is divided into 2-time shift 6-7 hours of work time each day, and sometimes can be overtime due to high production needs, so the workers need to work overtime and can be exposed to cosmetic dust for a long time.

The observational activity was also held by giving some questioner randomly distributed to all the workers at cosmetic division and some employees from other divisions that often visited had work related with the employee from

cosmetic division and needed to come in the cosmetic production area. The questionnaire which was previously randomly distributed to 34 workers shows 63,85% of workers are lack of knowledge about the importance of PPE usage in the area with high risk hazards such as in the cosmetic production area. 14 persons among them have respiratory disorders symptoms when they stay in the cosmetic production area sustainably.

Based on the preceding background and found cases, the writer was interested in researching the obedience of PPE usage to prevent respiratory disorder which is assumed to have a relationship with knowledge, education level, and job tenure of the workers in the cosmetic division at PT X.

### Method

This study used analytical survey research methods with a cross-sectional approach. The analysis took place in the PT X that was a cosmetic industry at cosmetic division. All data were compiled in October 2022. The population of survey was 56 persons from cosmetic division consist of supervisor, and workers from mixing, filling, and packaging section. Only 48 persons who participated was selected using a total sampling technique, and the rest of the sample can not participated in this survey due to some reason and condition. The instrument was using questionnaire which had been tested for validity and reliability. All questions were valid and reliable.

Independent variables were the knowledge about occupational safety and health, education level, and job tenure. Meanwhile, the dependent variable was the obedience of PPE usage. Statistical test using chi-square test was carried out with significant score of 0,05.

This research has received an ethical clearance certificate from the ethics committee of Komite Etik Penelitian Kesehatan (KEPK) on 13 October 2022 Number 03/UN37.1.6/TU/2022.

### Result and Discussion

Characteristics of the respondents were obtained from the data distribution of respondents based on age, sex, work section,

respiratory disorders symptoms, knowledge usage in the workplace. The distribution of about occupational safety and health, education respondents based on workers characteristic level, job tenure, and the obedience of PPE can be seen in Table 1 below :

TABLE 1. Distribution of respondents based on workers characteristics at cosmetic division

Characteristic	Frequency (n)	Percentage (%)
<b>Ages (years)</b>		
19-29	37	77,09
30-39	4	8,3
40-49	3	6,25
50-59	4	8,3
<b>Sex</b>		
Female	40	83,3
Male	8	16,7
<b>Work Section</b>		
Mixing	4	88,3
Filling	13	27,08
Packaging	31	64,58
<b>Respiratory Disorder Symptoms</b>		
Mild	12	25
Severe	36	75
<b>Knowledge</b>		
Less	6	12,5
Good	42	87,5
<b>Education Level</b>		
Junior High School	1	2,1
High School	41	85,4
Diploma	5	10,4
Bachelor	1	2,1
<b>Job Tenure (Years of service)</b>		
<4	32	66,7
>4	16	33,3
<b>Obedience of PPE Usage</b>		
Disobey	14	29,2
Obey	44	70,8

Resources : Primary Data (2022)

TABLE 2. Distribution of Variable

Variables	Obedient				Total		Association Coefficient Value
	Obey		Disobey		N	%	
	n	%	n	%			
<b>Symptomps</b>							
Severe	5	10,41	7	14,58	12	25	<b>0,024</b>
Mild	29	60,41	7	14,58	36	75	
<b>Knowledge</b>							
Less	5	35,7	1	2,9	6	12,5	<b>0,006</b>
Good	33	97,1	9	64,3	42	87,5	
<b>Education Level</b>							
Junior High School	1	2,08	0	0	1	2,08	<b>0,161</b>
High School	27	56,25	14	29,16	41	85,41	
Diploma	5	10,41	0	0	5	10,41	
Bachelor	1	2,08	0	0	1	2,08	
<b>Job Tenure (Years)</b>							
<4	23	69,7	9	64,3	32	66,6	<b>1,000</b>
>4	11	30,3	5	35,7	16	33,3	

Resources : Primary Data (2022)

Based on Table 1, the majority (77.09%) of respondents is in the aged range of 19 to 29 years and dominated by female respondents which is equivalent to 40 people (83.3%). The majority in workers distribution department is in the packaging section of the cosmetics division equivalent to 31 person (64.58%).

There are 2 of 3 (75%) person of the reponden go through severe symptoms of respiratory disorder and rest of them go through mild symptoms. The majority of respondents (42 persons or 87.5%) have good knowledge regarding occupational safety and health and Personal Protective Equipment (PPE). Most respondents (41 persons or 85.4%) are graduates from high school. Then, 36 respondents (75%) experienced symptoms of mild respiratory problems. Furthermore, the majority of respondents (34 persons or 70.8%) complied with the rules for using personal protective equipment in the work area.

Based on the bivariate test using the chi-square method to determine the relationship between the level of obedience to the use of PPE and the respiratory symptoms, knowledge, level of education, and years of service (job tenure), it was found that respiratory symptoms has p-value of 0,024 and knowledge of OSH has p-value 0,006 is related to the level of compliance with the use of PPE because the score of p-value <0,05. One participant who has less knowledge regarding OSH and the importance of PPE is considered to have 18,3 times more risk of being disobedient in using PPE. The education level variable has a p-value of 0,161 and the years of service (job tenure) variable has a p-value of 1,000. Therefore, there is no relationship occurs between education level and job tenure with the obedience of PPE use by workers because the p-value is > 0.05.

The relationship between respiratory symptoms and the obedience of PPE usage can be seen in Table 2. There is 29 respondents who obey to use PPE and has severe symptoms of respiratory disorder, and 9 responden who suffer severe symptoms disobey to use PPE. The other respondents who suffer mild symptoms of respiratory disorder there are 5 responden who obey to use PPE and 7 responden who disobey.

The results of bivariate analysis can be seen that the results of the chi-square statistical

test show a p-value of 0.024 (< 0.05). These scores indicate that statistically, respiratory symptoms is having strong and significant relation to the obedience with the use of PPE among workers in the cosmetic division of PT. X. The more a person experiences severe symptoms, the awareness of obedience to use PPE is higher to protect them self suffer a respiratory disorder and work in uncomfortable condition (Kammoolkon et al., 2022).

According to Awealom's research on particleboard workers at Ethiopia, the stature of dust exposure than the recommended limit values for inhalable wood dust at a workplace increase the risk of respiratory disorder, caused the particleboard workers that did not use proper personal protective equipment (PPE) mainly face mask during work (Awealom, 2019). Respiratory symptoms including cough, phlegm, chest tightness, and wheezing were significantly higher to women workers in processing section than at the office workers or woodworkers (Davood, 2020). The nature of respiratory disorder was associated with occupational exposure to processing dust is consistent with the pattern of obstructive lung disease (Neghab, 2015). Organize trainings in safety may also positively influence the behavior of employees to improve safety cultures and comply with workplace regulations and standards such as the use of PPE to prevent respiratory disorders although it just seen by the symptoms (Tesfaye, 2021).

The relationship between knowledge and the obedience of PPE usage can be seen in Table 2. There is 33 respondents (97.1%) have good knowledge of complying with the use of PPE in the work area; 9 respondents (64.3%) are disobey; 5 respondents (35, 7%) have poor K3 knowledge; and 1 respondent (2.9%) is disobey.

From the results of bivariate analysis, it is known that the results of the chi-square statistical test show a p-value of 0.006 (< 0.05) and a 95% CI value of 1.894-177.459. These scores indicate that statistically, knowledge is related to the obedience with the use of PPE among workers in the cosmetic division of PT. X. A worker who has less knowledge regarding OHS and personal protective equipment is considered to have 18,3 times more risk of being disobey in using PPE.

Based on the percentage results, the relationship between good OSH knowledge creates a sense of obedience and increased self-awareness in using PPE. Knowledge of OSH that is less risky causes workers to be not obey with using PPE in the work area (Azzahri and Ikhwan, 2019). This is because knowledge or cognitive mindset is the main and essential thing for encouraging someone's behavior and actions. Behavior based on good knowledge shows a more prominent output than one which is not. Knowledge can also be generated from knowing and being familiar with activities or experiences of a particular object or activity (Adiputro, 2019).

The results of this recent study are in line with studies conducted by Adiputro (2019) on Kimia Farma clinical laboratory workers, demonstrating a strong relationship between knowledge and the use of PPE. The research believes that respondents who use PPE appropriately must have good knowledge. Meanwhile, respondents who do not use PPE appropriately possess less knowledge (Preda et al., 2022).

From the calculation of the relationship between education level and the obedience with the use of PPE, it is known that there are one respondent (2.08%) has the highest level of education, namely a bachelor's degree. In addition, there is also one respondent (2.08%) with the lowest educational level, namely junior high school. Respondents with diploma degree are 5 (10.41%) and show an obedient attitude towards the use of PPE in the work area. Meanwhile, the majority of other respondents (41 respondents or 85.41%) have an education level up to high school, 14 of them (29.16%) are disobedient in the use of PPE.

In this research results shown that there is no relationship between variable of education level and the obedience to the use of PPE among workers in the cosmetics division at PT X based on the bivariate analysis, because it is known that the result of the chi-square statistical test shows a p-value of 0.161 ( $> 0.05$ ).

According to Burtanto's research related to industrial safety and health practical guidelines, the education level of the workforce can influence the compliance in using PPE. Workers with higher education will be better

because they already have broader knowledge and insight about the importance of using PPE (Buntarto, 2015).

The results of this variable are not in line with research conducted by Selviana & Anggraeni (2021) on health workers at the Martapura Health Center. Selviana's states that there is a significant relationship related to education level and compliance with the use of PPE. The researcher believes that there is a causal relationship between respondents who have a higher education level; respondents with undergraduate education level have better compliance than respondents with only diploma level, who are considered unfamiliar with using PPE properly (Selviana & Anggraeni, 2021).

Education at the university level today also provides insight into work safety related to work risks that exist in the future according to each major (Shieh et al., 2012). Workers who have received education at university theoretically have a better understanding of working safely and obediently (Smith and Frank, 2005).

According to data from the Ontario Workplace Safety and Insurance Board (WSIB) in 2006, workers in the ages of 15-24 has high school education levels and do not attend college have injuries resulting in losing work time. This situation is because the workforce did not carry out work safely and use personal protective equipment (Alexander et al., 2016). Workers with upper secondary education levels were categorized as adolescent workers approaching adulthood and in the transition period from school to work. Hence, they do not have sufficient mentality and readiness and tend to be unstable, leading to a lack of compliance with applicable regulations (Breslin, Smith, and Dunn, 2007).

In the relationship between variable job tenure or year of services with obedient of PPE usage, shown that 9 respondents (64.3%) out of 32 respondents (66.6%) who has been working for  $< 4$  years are non-compliant in using PPE. Meanwhile, 5 respondents (35.7%) out of 16 respondents (33.3%) who has been working for  $> 4$  years are still disobedient in using PPE.

In terms from the percentage results of the bivariate analysis, it was found that the result of the chi-square statistical test shows a

p-value of 1.000 ( $> 0.05$ ). This score indicates that statistically, there is no relationship occurs between variable job tenure and the obedience of PPE usage among workers in the cosmetic division at PT X.

The regulations for using PPE in the work area is expected to be obeyed and carried out by workers to prevent unwanted incidents. Workers with more than four years duration are expected to have better compliance with the use of PPE than workers with shorter periods (Isara et al., 2016). Habituation of behavior with adequate knowledge and understanding of this workforce can increase self-awareness in working safely. Workers with short working period tend to have less knowledge and understanding, and this results in lower awareness to comply with PPE usage (Almahmoud et al., 2020). At the end, the risk of work accidents or work-related diseases is inclined (Wireko-Gyebi et al., 2022).

Theoretically, workers with long tenure have a better understanding and compliance with existing rules compared to those working for less than one year. This is in line with a study by Breslin and Smith (2006) regarding the multivariate research on the relationship between the length of work and work accidents. The study states that the increased risk of work accidents in young workers is caused by a lack of work experience, knowledge on work hazard risk factors, and compliance with applicable rules.

### Conclusion

Based on the results and discussion to analyze relations of obedience of PPE usage with respiratory symptoms, knowledge, education level, and years of services in cosmetics division workers at PT. X, there is a relationship between workers's respiratory symptoms and knowledge regarding Occupational Safety and Health and the obedience with the use of PPE in the work area with a p-value of 0,024 and p-value of 0.006. Meanwhile, the education level and years of services have no relationship with the obedience in the PPE usage in the work area, indicated by respectively a p-value of 0.161 and p-value of 1.000 It's recommended to company owner to provide training for the workers about self awareness and the importance of PPE usage

that mainly corrects and precisely, also doing supervision and daily checking on the workers before, during, and after work.

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