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The relationship between work period and use of personal protective equipment with respiratory disorder complaints in brick craftsman in Sintuk Toboh Gadang District Padang Pariaman Regency 2017

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Abstract. Respiratory disorders are not only caused by high concentration of dust, but also affected by employee's habit and characteristics. Based on the data from Sintuk Health Center, there are 145 cases of ISPA in this region. Over all, the brick craftsman smoke and don't use the personal protective equipment. This study aims to determine the relationship between work periods and use of personal protective equipment with respiratory disorders on brick craftsman in Sintuk Toboh Gadang, Padang Pariaman Regency 2017. The research is *descriptive analytic* research with *cross sectional* approach which was conducted on 11-21 August 2017. This study used *Cluster Sampling* with 73 people of total sampling which then using *Accidental Sampling* and questionnaire to collect the data. The data analysed by using *Chi-Square* test. The result shows that among 73 respondents, there were 47 people (64,4%) infected respiratory disorders, 41 (56,2%) of times work, 39 (53,4%) work periods, and 55 people (75,3%) do not use personal protective equipment while working. Statistical test revealed that the variables which have relationship with the habit of respiratory disorders were times work ($p=0,003$, $OR=5,304$), work periods ($p=0,000$, $OR=7,857$), and use of personal protective equipment variables ($p=0,004$, $OR=5,857$). From the research, it was found that times work, work periods, and use of personal protective equipment have a strong impact to respiratory disorders. It is suggested that brick craftsman need to use the personal protective equipment in producing craftsman. Therefore, long work periods do not give impact to the respiratory disorders.

1. Introduction

Air is an environmental component which has a very important role for human life. Air pollution is the presence of one or more physical, chemical or biological substances in the atmosphere that can endanger the health of human, animal and plant, disrupt aesthetics and comfort, and damage the property [1].

The health of workers is influenced by several factors, one of which is the workplace environment. According to Law No. 1 of 1970, the work environment is a place where there are many dangerous sources, one of which is air contamination which is generally known as air pollution [2].

Based on WHO data (*World Health Organization*) in 2010, among all the occupational diseases, 30% to 50% are silicosis and other pneumoconiosis. *The International Labor Organization* (ILO)



revealed that the causes of deaths workers are caused by 34% of cancer, 25% of accidents, 21% of respiratory diseases, 15% of cardiovascular diseases, and 5% caused by other factors. These diseases are caused by the exposure of dust in the workplace occurring throughout the world every year [3].

Acute respiratory infection (ARI) is a major health problem as evidenced by the prevalence of ARI in Indonesia reaches 25.5% (range: 17.5% -41.4%) in 16 provinces including prevalence above the national rate and pneumonia 2.1% (range: 0.8% - 5.6%) [3].

Acute respiratory infection (ARI) is an acute infection of the upper and lower respiratory tract caused by microorganisms or bacteria, viruses, or ricketts with or without pulmonary parenchyma inflammation. Several risk factors that affect the prevalence of ARI are environmental factors, individual characteristics, and worker behavior. Environmental factors include air pollution (cigarette smoke, air pollution due to industrial products, and high concentration smoke from burning fuel for cooking). Individual factors such as age, gender and education level can also influence the risk of susceptibility to ARI. Behavior of workers includes smoking and the use of masks [4].

Brick making is the fastest-growing industrial sector in many countries (such as China, India, Bangladesh and Pakistan) and between three sectors, together with vehicle smoke and road dust resuspension, contribute to air pollution and health problems in Dhaka (Bangladesh) [5].

The brick making factory is a business that produces bricks. Brick workers work every day with an average working time of ± 8 hours per day. In a day one worker is able to produce ± 2000 bricks. So the risk of respiratory tract disorders in brick workers is very high [6].

The research conducted by Asfawi (2015) showed that there was a relationship between years of work with subjective complaints of breathing in female poultry traders at Penggaron RPU, Semarang City. It was proved by using the *Pearson Product Moment test* which showed a significance value of 0.01 [7].

Based on the study conducted by Josephus (2015), it was known that there was a relationship between the use of personal protective equipment *respirator* with lung vital capacity based on statistical test value of *P values* $0.00 < 0.05$ [8].

Sintuk Toboh Gadang is one of the Subdistricts in Padang Pariaman Regency which is famous for its abundant brick production. The majority of the population in this region works as brick workers. The brick business has been around for decades. The workers are mostly men but infrequently women are also involved in the manufacturing process, for example in printing bricks. The process of making brick takes a long time up to 2 weeks to be ready for the market. The process starts from softening clay, printing, drying, burning, and cooling bricks. The combustion process uses firewood and lasts for 3 days 2 nights. However, in processing and burning bricks themselves, air quality measurements have never been measured.

Based on the results of the annual disease report from all puskesmas in 2016, there were 24,577 cases of ISPA or 31.8% cases. ARI is in the first rank of the top ten diseases most often suffered by the community and the highest number of the cases is in the working area of Sintuk Community Health Center [9].

Based on the data of the top ten diseases in 2016 from the Sintuk Health Center, ARI is the highest disease suffered by the resident with 145 cases. Then the data obtained from the local Midwives in January to April 2017, there were 30 workers from Jorong Palembayan and 42 workers from Jorong Batang Tapakis who were diagnosed with ARI. [10,11].

Based on the preliminary observation, there were 3 from 5 workers had respiratory complaints during the burning process such as shortness of breath, cough and flu due to smoke from the burning bricks. The workers commonly have bad smoking habit and do not use personal protective equipment (PPE).

In the brick industry, the amount of wood burned is quite large which is around 6-8 tons for each burning process. The combustion process uses high temperatures then lead the thick smoke appears and it certainly cause bad effects on health. In addition, the distance between one brick factory and the other is close together, the burning of bricks area is very close to residential areas and public roads.

Since the working period and personal protective equipment are closely related to respiratory problems in brick workers, the researchers need to examine the relationship between them.

2. Research Methods

This study was *descriptive analytic research*. It used *across-sectional* design where all independent and dependent variables were measured at the same time when the study took place. The research was conducted on 11-21 August 2017 in Jorong Palembayan and Jorong Batang Tapakis Sintuk Toboh Gadang District Padang Pariaman Regency. The sampling used was *Cluster Sampling* with 73 people of total sampling which then using *Accidental Sampling* and questionnaire to collect the data. The data was analysed by using *Chi-Square test* [12].

3. Results and Discussion

Based on the study conducted on the Relationship between Duration of Work Period and Use of Personal Protective Equipment with Respiratory Disorders Complaints in Brick craftsman in Sintuk Toboh Gadang, Padang Pariaman Regency in 2017, the results were as follows:

3.1. Univariate Results

3.1.1. Frequency distribution of working period. Based on the table 1 above, it clearly shows that there are 39 respondents (53.4%) who have worked more than six years.

Table 1. Frequency Distribution of Respondents' Working Period

No	Working Period of Respondents	F	(%)
1	Length (> 6 years)	39	53.4
2	New (\leq 6 years)	34	46.6
	Total	73	100

The result of this study is in line with the research conducted by Hariyono, et al (2016) which found that there are 67 respondents from 82 workers have the longest work period for more than ten years working [13]. Working period is the length of time a person works in a particular field of work. Duration of work also affects the occurrence of work accidents. It because the length of time a person works will affect his work experience [14].

3.1.2. Frequency distribution of the use of ppe. Table 2 above shows that there are 55 workers from 73 respondents do not use protective equipment.

Table 2. Frequency Distribution of the Use of PPE Respondents

No	Use of PPE	F	(%)
1	No Use	55	75.3
2	Use	18	24.7
	Total	73	100

However, there is only 18 respondents use the protective equipment. It means that the workers who didn't use protective equipment are greater than the workers who use protective equipment. This study has the same result with the study conducted by Fahmi (2012) related to the use of personal protective equipment (PPE). The result showed that there were 27 workers from 45 respondents (60%) used PPE. In gold producers in the Tatelu community mining area, dimembe district was found that 48.8% workers did not use masks and 51.2% workers used masks [15]. Personal protective equipment (PPE) is a tool that must be used while working in order to maintain the safety of the workers themselves and the people around them [16].

3.1.3. Frequency distribution of complaints of respiratory disorders. Based on the table 3 above, it can be seen that there are 47 (64.4%) workers from 73 respondents have respiratory tract disorders complaints.

Table 3. Frequency Distribution of Respiratory Tracts complaints on Respondents

No	Complaints of Respiratory Disorders	f	(%)
1	There are Complaints	47	64.4
2	No Complaints	26	35.6
Total		73	100

The amount is greater than the workers who have no complaints which are only 26 workers (35.6%). The result of this study is in line with the research conducted by Hariyono, et al (2016) which found that there were 50 workers (61.0%) from 82 respondents who have respiratory complaints. Furthermore, this study is also in line with the research conducted by Sandra (2013) which found that from 42 respondents, there were 40 workers (95%) have respiratory complaints [13].

In the course of the disease, the symptoms may be more severe. If it more severe, it can be fall into respiratory failure and causes death. When respiratory failure occurs, more complicated management is needed, however mortality is still high. Thus, it is necessary to do quick actions related to the disease so that it is not fall into respiratory failure [17].

3.2. Bivariate Results

3.2.1. Relationship work period with complaints disorders respiratory on respondents. The results of the analysis of table 4 explains about the relationship between the work period and respiratory disorders. It is found that there are 33 workers (84.6%) who have respiratory problems from 39 respondents with long working period (> 6 years). While from 34 respondents who have a new service period (≤ 6 years), there are 14 respondents (41.2%) who have respiratory complaints.

Table 4. Relationship of Work Period and Respiratory Disorder Complaints on Respondents

Work Period	Complaints of Respiratory Tract Disorders						P <i>value</i>	OR CI 95%
	There are Complaints		No Complaints		Total			
	N	%	N	%	n	%		
Old	33	84.6	6	15.4	39	100	0,000	7.857
New	14	41.2	20	58.8	34	100		(2.600
Total	47	64.4	26	35.6	73	100		to 23.745)

The results of the statistical test shows that $Pvalue = 0,000$, where $Pvalue < 0.05$. It can be concluded that there is a significant relationship between work period and complaints of respiratory disorders on the respondents. Based on the analysis, it also finds that $OR = 7.857$. It means that those who have long working period (> 6 years) have an opportunity to have respiratory problems 8 times greater than those who have new working period (≤ 6 years). This result is supported by the research of Pangemanan (2015) on the relationship between work period and the incidence of pneumoconiosis with p value 0.002. The significant value of the relationship between work period and the incidence of pneumoconiosis is smaller than 0.05. Thus, it can be concluded that there is a significant relationship between the work period and the incidence of pneumoconiosis in cement collecting workers in the cement packing unit of PT. Tonasa Line Bitung City. The analysis result of the relationship between work period and the incidence of pneumoconiosis shows that the OR value is 11,333. It can be assumed that the workers who have long working period (≥ 10 years) have the possibility to get pneumoconiosis 11,333 times than those who have a new working period (< 10 years) [18].

The study above is also supported by Suma'mur's statement which says that work period determine how long the workers' have a risk on dust exposure. the greater the dust exposure of a person, the

greater the risk of lung disease. Working period is the length of time a person works in a particular field of work. Duration of work also affects the occurrence of work accidents. Therefore, work period will affect someone's work experience [14].

3.2.2. Relationship between the use of ppe and complaints of respiratory disorders in respondents. The table above clearly shows that there are 41 respondents (74.5%) who did not use PPE have respiratory complaints, whereas from 18 workers using PPE, only 6 of them (33.3%) have respiratory complaints.

Table 5. Relationship the Use of PPE and Respiratory Disorder Complaints on Respondents

Using PPE	Complaints of Respiratory Disorders				Total		P <i>value</i>	OR CI 95%
	There are Complaints		No Complaints					
	n	%	N	%	n	%		
Not Use	41							74.5 14
Wear	6	33.3	12	66.7	18	100		25.5 55
Total	47	64.4	26	35.6	73	100		100 0.004 5.857 (

Based on the statistical test results, it is known that P value is 0.004 which is less than 0.05 (<0.05). It can be concluded that there is a significant relationship between the use of PPE and respiratory complaints of the respondents. Based on the analysis, it also found that the value of OR is 5.857, which means that respondents who do not use PPE have a possibility of having respiratory problems 6 times greater than those using PPE. This research is in line with the research conducted by Sudarmaji (2015), the Chi Square test results shows a significant relationship between the use of masks and respiratory complaints (p -value = 0.014). Personal protective equipment (breathing) must be used by all workers in the industry which produce dust in the production process. The types of personal protective equipment that are widely used by Unit Y workers are masks made of cloth / t-shirts and disposable masks [19].

The use of these type of masks do not guarantee that they can protect workers from the possibility of breathing dust and small-sized particles. Types of respiratory protective equipment that can be used by wood industry workers are such as catheter respirators, and canisters. The obligation to use masks is one of the company's efforts to protect workers from dust exposure. The type of mask used must be suitable for the potential hazards and risk factors in the work environment since the level of mask protection is influenced by the type of dust, mask, and the ability of the mask to filter dust [20].

4. Conclusion

From the study it was found that more than 50% of brick workers worked more than 8 hours per days for more than 6 years and did not use complete PPE so there are many complaints of respiratory problems. It shows that working period and the use of PPE have strong relationship with respiratory complaints. It is recommended that brick workers can reduce their time working in a day and use PPE at work so that the long working period does not affect the respiratory tract.

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