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Factors Associated with Vital Capacity of Lungs on Labors of Ceramic Home Industry "Dini-Koe" Tlogomas Malang

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Abstract: Dini-Koe Ceramic is a home industry produces souvenirs made of ceramic. The content of dust in production room or mention finishing which in that part still have a lot of dust formed because of turning process or sanding. Type of dust formed is silica dust by size 1-3 micron with that particle size can ent and patch until alveoli. Incoming particles in to alveoli will form focus and gathered in the early part of the lung lymph channels which can interference dysfunction or impairment of vital lung capacity. These abnormalities occurs due to the damage of lung channels which is progressive and irreversible (can't be normal again) and can influence to the productivity and quality of works, 20 respondents found that labors of ceramics are adults age (12-45 years old) amount 8 persons (40.0%) respondents while the elderly (46-65 years old) amount 12 persons (60.0%) respondents, respondents that obtained hospital disease has the greatest are 13 persons (65.0%) while respondents that with no hospital disease associated with KVP amount 7 persons (35.0) respondents. Dust particle will have in the air over a relatively long time in a state hovering in the air then ent in to the human body through breathing. Besides might harm to health too can interfere with opaque eyes and can held a variety of chemical reactions, so that, the composition of dust in the air can be a complex particle.

INTRODUCTION

In certain conditions, dust is danger that can inflict big loss. The released dust can cause reduced working comfort, interference vision, interference lung function or even can cause common poisoning. If the concentration of dusts in the workplace is higher than th air quality of national standard, it will inflict interference health of the employees. Therefore, we need to have balance and harmony between man and workplace. According the result of research, the Surveillance of Work Related and Occupational Respiratory Disease (SWORD) which was conducted in England showed that there were 3.300 new cases of lung sickness that related to the work.

It has been known that raw materials for ceramic industry produces a lot of dust both from the beginning processing of raw materials until finishing of the process which put the workers to highly exposed of the dust.

Dini-Koe Ceramic is a home industry produces souvenirs made of ceramic. The content of dust in production room or mention finishing which in that part still have a lot of dust formed because of turning process or sanding. Type of dust formed is silica dust by size 1-3 micron with that particle size can ent and patch until alveoli. Incoming particles in to alveoli will form focus and gathered in the early part of the lung lymph channels which can interference dysfunction or impairment of vital lung capacity. These abnormalities occurs due to the damage of lung channels which is progressive and irreversible (can't be normal again) and can influence to the productivity and quality of works (Hasty, 2011).

According to the research background above, so, researcher wanted to study the factors that influence capacity of lung vital on workers at ceramic home industry "Dini-Koe" in Tlogomas Malang.

General purpose: To analyze factors that related to the capacity of lung vital on workers at ceramic home indusry "Dini-Koe" in Tlogomas Malang.

Specific purpose:

- Identify charateristic of life style cover by habit of smoking and sport habit on workers at the ceramic home industry "Dini-Koe" Tlogomas of Malang
- Identify individual characteristics cover by age, gender and hospital disease on workers at ceramic home industry "Dini-Koe" Tlogomas of Malang
- Identify years of service on workers at the ceramic home industry "Dini-Koe" Tlogomas of Malang
- Identify habit of using mask on workers at the ceramic home industry "Dini-Koe" Tlogomas of Malang
- Measure content of dust in the production room at the ceramic home industry "Dini-Koe" Tlogomas of Malang
- Measure capacity of lung vital on workers at the ceramic home industry "Dini-Koe" Tlogomas of Malang
- Analyzing the relationship characteristic of life style cover byy smoking habit and sporting habit with lung vital capacity on workers at the ceramic home industry "Dini-Koe" Tlogomas of Malang
- Analyzing the relationship individual characteristic cover by age, gender and hospital disease with lung vital capacity on workers at the ceramic home industry "Dini-Koe" Tlogomas of Malang
- Analyzing the relationship years of service with lung vital capacity on workers ceramic industry "Dini-Koe" Tlogomas of Malang

MATERIALS AND METHODS

The design of research used in this study was analytical observation with cross sectional approach. Population in this research are 52 workers at ceramic home industry Dini-Koe Tlogomas Malang and 20 persons were taken as respondents. The data was analyzed using fisher test.

RESULTS AND DISCUSSION

Individual characteristic: Based on Table 1 can be known that of the total 20 respondents found that labors of ceramics are adults age (12-45 years old) amount 8 persons (40.0%) respondents while the elderly (46-65 years old) amount 12 persons (60.0%) respondents.

Based on Table 2 can be found that ceramic workers most sex are male amount 11 persons (55.0%) respondent while ceramics workers female amount 9 persons (45.0%) respondents.

Based on Table 3 can be described respondents that obtained hospital disease has the greatest are 13 persons (65.0%) while respondents that with no hospital disease associated with KVP amount 7 persons (35.0) respondents.

Lifestyle characteristics of workers: Based on Table 4 can be described that smoking habit of respondents amount 9 persons (45.0%) respondents while respondents that not smoking amount 11 persons (55.0).

From Table 5 can be found that by 20 respondents including 5 persons (25.0%) respondents did sporting activities and 15 persons (75.0%) respondents wasn't doing sporting activity.

Habit of wearing mask: By Table 6 can be drawn that habit of workers wearing masks amount 14 persons (70.0%) respondents while workers unaccustomed wearing masks amount 6 persons (30.0).

Table 1: Characteristic of respondents according to age

Age	F	Percentage
12-45	8	40.0
46-65	12	60.0
Total	20	100.0

Table 2: Characteristic of respondents according to the age

Sex	F	Percentage
Male	11	55.0
Female	9	45.0
Total	20	100.0

Table 3: Characteristics of respondents according to hospital disease associated with KVP

Hospital disease KVP	F	Percentage
Yes	13	65.0
No	7	35.0
Total	20	100.0

Table 4: Lifestyle characteristics of respondents according to smoking habit

Smoking habit	F	Percentage
Yes	9	45.0
No	11	55.0
Total	20	100.0

Table 5: Lifestyle characteristics of respondents based on sporting habit

Sporting habit	F	Percentage
Yes	5	25.0
No	15	75.0
Total	20	100.0

Table 6: Habits of workers wearing masks

Habit of wearing mask	F	Percentage
Yes	14	70.0
No	6	30.0
Total	20	100.0

Table 7: Work period on ceramic workers

Work period	F	Percentage
>6 months	18	90.0
<6 months	2	10.0
Total	20	100.0

Table 8: Dust concentration at ceramic home industry Dini-Koe Ceramic

Dust concentration (mg m^{-3})	F	Percentage
<0.13	6	70.0
<0.15	14	30.0
Total	20	100.0

Table 9: Interference of lung vital capacity on ceramics workers

Interference KVP	F	Percentage
Yes	17	85.0
No	3	15.0
Total	20	100.0

Work period: By Table 7 shown that work period on ceramic workers with old category >6 months amount 18 persons (90.0%) respondents and new category <6 months amount 2 persons (10.0%) respondents.

Dust concentration: By Table 8 shown that the environments of ceramic workers that fulfill standard of NAB is set amount 6 persons with the presentation in the amount of (70.0%). While the environments of ceramic workers those wasn't fulfill the standard of NAB is 14 persons by the presentation in the amount of (30%).

Lung vital capacity: Based on Table 9 shown that by 20 respondents those who impaired KVP amount 17 persons (85.0%) respondents and those who dosen't impaired KVP amount 3 persons (15.0%) respondents.

Relationship individual characteristic by KVP on workers at ceramic home industry Dini-Koe Ceramic Relationship between age and lung vital capacity: Based on Table 10 found that ceramic workers by adults (7 of 8 respondents) be avowed obtain interference KVP 87.5% while ceramic workers on elderly age obtain iterference KVP in the amount of 83.3% (10 of 12 respondents). Based on result of statistics tested found value p-value in the amount of 0.030 means that on α5% have a significant relationship between age and KVP on workers at ceramic home industry whole in Tlogomas Malang in 2015.

According to the statement that respiratory function and blood circulation will increase in childhood and until maximal on age 20-30 years old, then will decrease again according to the increasing age. The same statement also found by Suryono who states that someone getting older of age then the greater the posibility of decline in lung function. That matter also in line with results of research which is conducted by Mila (2006) that somenone getting older it's posibility to get lowering capacity of vital lung of somenoe.

Relationship between gender and capacity of vital lung: On Table 11 mentioned that workers at the ceramic home industry with male gender that experience interfence of KVP amount 81.8% (9 of 11 respondents). Then type of female gender that experience interfence of KVP amount 88.9% (8 of 9 respondents). Based on results of statistic tested available value of p-value amount 0.031 means that on α5% be found relationship is very significant between gender and KVP on workers at ceramics home industry Tlogomas Malang in 2015.

Power to accomodate air volume between men and woman most men, because anatomically volume of lung men is greater compared with woman, this matter which can caused of differences amount of air volume that found on men and woman lungs. Other part men need more energy compared with woman, therefore men need more oxygen. In this research, women more abnormal lung function, this matter cause of lungs volume on woman fewer compared with men, so that, the risk impaired lung functiong most compared with men (Nugraheni, 2004).

According to Madina (2007), volume and capacity all lungs on woman +20-25% smaller than men until age of puberty, cardorespiratory endurance between girls and boys not different but after that age its worth lower 15-25% of boys. Differences strength maximum muscle, surface area of body, body composition, muscle strenght amount of hemoglobing and lung capacity.

Relationship between hospital sheet with KVP: By Table 12 found that ceramics workers that ever have hospitals sheet that related with KVP amount 100% (13 of 13 respondents) while ceramics worker that never have hospital sheet that related with KVP, however have disruption KVP amount 57.1% (4 of 7 respondents). Based the results of statistics tested found value of

Table 10: Age relationship with KVP

	KVP					
	Distructions		Distructions			
Parameters	N	Percentage	N	Percentage	No P-total N	Value (%)
USIA	0.030					
Adults	1	12.5	7	87.5	8	100
Elderly	2	16.7	10	83.3	12	
Total	3	14.6	17	85.4	20100	

Table 11: Relationship between gender and capacity of vital lung

	KVP (No)					
	Distructions		Distructions		Total value	
Variables	N	Percentage	N	Percentage	N	Percentage
Gender						
Male	2	18.2	9	81.80	11	100
Female	1	11.1	8	88.90	9	100
Total	3	14.65	17	85.35	20	100

Table 12: Relationship between hospital sheet with KVP

	KVP					
	Distractions		Distractions		Total	
Variables	N	Percentage	N	Percentage	N	p-values (%)
Hospital sheet						0.031
Not obtain	3	42.9	4	57.1	7	100
Obtain	0	0	13	100	13	100
Total	3	21.4	17	78.55	20	100

p-value amount 0.031% it's means that on α5% found significant relationship between hospital sheet with KVP on ceramics home industry workers in Tlogomas Malang in 2015.

Someone has experienced disease disruption on lung function will likely decrease ventilation perfusion, so that, alveolar will fewest interruption air changing and resulting in reduced oxygen levels in the blood. Ventilation is process of exit and entry the air blood in to the lungs. Lung ventilation cover the basic movements or breath activities or inspiration and expiratory. While lung perfusion is blood movements that through lung circulation for oxygenated where the pulmonary circulation is the oxygenated blood that flow in the pulmonary artery from the right ventricle of the hearth. Strong gas exchange in lung influenced by circumstances of ventilation and perfusion. Emphysema is a decease know major that influence lung volume because can destroy lung tissue, so that, influence the elasticity of the lung tissue (Mengkidi, 2016).

Relationship life style with KVP on workers at ceramics home industry Dini-Koe ceramic

Relationship between smoking habit with KVP: On Table 13 shown that ceramics workers that smoke and obtain disruption KVP amount 80% (7 of 9 respondents). Based the results of statistics test found value p-value amount 0.218 it's means that on α5% wasn't found significant relationship between smoking activity with KVP on workers at ceramics home industry in Tlogomas of Malang in 2015.

According to Suyono cigarette smoke irritate the lungs and enter in to blood flow. Smoking is more degrading lung vital capacity compare some health danger cause of work.

Certainly this result of research is different with he theory of research that found before. There is no relationship between smoking habit with KVP because of the prevalence of respondents that ever smoke less, if compare with the prevalence of non smokers that related to the lungs. Can be found that in this research amount of woman labors are 9 persons and declared non-smokers while amount of men labors are 11 persons 2 of them did not smoke while another are smokers. There are 9 persons only 2 of them crash. Workers who do not smoke the capacity of lungs function will be better than workers who has habit of smoking. So that, results of statistic tested don't have significant relationship between workers age with KVP namely with the values p = 0.218 of value α0.05.

Table 13: Relationship between smoking habit with KVP

Variables	Distractions		Distractions		Total		
Smoking habit	N	Percentage	N	Percentage	N	Percentage	p-value
Not smoking	11	100	0	0	11	100	218
Smoke	2	20.0	7	80.0	9	100	
Total	13	60.0	7	78,55	20	100	

Table 14: Relationship between sporting habit with KVP

	KVP						
	Distractions		Distractions				
Variables	N	Percentage	N	Percentage	n	Percentage	p-value (%)
Sporting habit							0.009
Yes	3	60.0	2	40.0	5	100	
No	0	0	15	100	15	100	
Total	3	30	17	70	20	100	

Table 15: Relationship between habit of using mask with KVP

	KVP					
	Distractions		Distractions			
Variables	N	Percentage	N	Percentage	N	p-values (%)
Habit of using mask						0.009
Yes	3	60.0	2	40.0	5	100
No	0	0	15	100	15	100
Total	3	30	17	70	20	100

Relationship between sporting habit with KVP: On Table 14 shown that ceramic workers that wasn't doing the sporting habit and impaired KVP amount 100% (15 of 15 respondents) while ceramic workers that have a sport still impaired KVP amount 40.0% (2 of 5 respondents). Based on results of statistic test found value of p-value amount 0.009 it's means that on α5% found significant relationship between sport activities and KVP on workers in ceramic home industry in Tlogomas of Malang in 2015.

Sport activity will influence the capacity of lung. Physical exercise very influencial on the development of the respiratory system. Sport activity will give benefit in improving working organ, specially lungs, hearth blood vessels characterized by resting pulse decreases, capacity of vital lung increases, reduced lactic acid buildup, increasing High Density Lipo protein (HDL) cholesterol and reduce atherosclerosis.

Generally all sports, games and physical activity help to increase physical fitness, however depend on the type of sport which is conducted (Mengkidi, 2006).

Relationship between habit of using masks with KVP on workers at the ceramic home industry: By Table 15 can found that average KVP on workers that who didn't use a mask 100% (14 of 14 respondents) while ceramic workers that use a mask, however, impaired KVP amount 50.0% (3 of 6 respondents). Based on results statistic tested found values p-value amount 0.018 it's means that α5% found significant relationship between habit of using a mask with KVP on workers at the ceramic home industry in Tlogomas of Malang in 2015.

Workers that who work activity many exposure by dust particle need personal equipment tool in the form of masks to reduce amount of particle which might be inhaled. Workers who obedient to use a mask at work in dust area will minimize amount of exposure dust particle which might be inhaled. In addition, to the amount of exposure, particle size the possibility of escaping from the mask to be small (Budiono, 2007).

Relationship between years of service with KVP on workers at the home industry Dini-Koe Ceramic: On Table 16 shown that ceramic workers that have years of service >6 months (length) have KVP distraction amount 94.4% (17 of 18 respondents) while at the ceramic workers who have year of service <6 months (new) and have KVP distraction amount 0% (0 of 2 respondents). Based on the results of statistic test found values p-value amount 0.016 it's means that on α5% found significant relationship between years of service with KVP on workers at the ceramic home industry in Tlogomas of Malang in 2015.

Table 16: Relationship between years of service and KVP

	KVP					
Variables	N	Percentage	N	Percentage	Total N	p-values (%)
Years of service						0.016
New (<6 months)	2	100	2	0	2	100
Lenght (>6 months)	1	5.6	15	94.4	18	100
Total		52.8	17	47.2	20	100

Length of working time everyday also can cause workers continue to be exposed by condition of work inviroment that cover by dust.

According to Faridawati (2003), time that need by someone that exposed by dust to disturbance lung function <1 year. This matter in line with research that did by Dwiantoro that the longer period the workers then decreases capacity of vital lung, this show with the value p = 0.014. Decreases capacity of vital lung can relate with more exposed total of dust content at the work inviroment. This result also in line with research by Budiono (2007).

Dust particle will have in the air over a relatively long time in a state hovering in the air then ent in to the human body through breathing. Besides might harm to health too can interfere with opaque eyes and can held a variety of chemical reactions, so that, the composition of dust in the air can be a complex particle (Pudjianstuti, 2003).

CONCLUSION

Based on characteristics of workers life style, it showed that most of workers don't have smoking habit (9 people including woman who do not smoke) most of them didn't do exercise. Based on individual characteristics on ceramic workers, there were more elderly aged adult while the gender, there were more men than woman and most of them have the history of disease. Most of the ceramic workers have been working for 2 years. Most of the ceramic workers did not wear the mask. The highest dust rate at the production room in the part of finishing with the total of dust content amount 2.137 mg m^{-3}. Based on the result examination spirometry most of lung vital capacity (KVP) ceramic workers impaired. There is relationship between characteristic of life style (Sport activity) with KVP but there was no relationship between characteristic of life style (smoking habit) with KVP on the workers at the ceramic home industry "Dini-Koe" in Tlogomas of Malang. There is relationship between individual characteristic (age, gender and the history of disease) with KVP on the workers at the ceramic home industry "Dini-Koe" in Tlogomas of Malang. There is relationship between years of service with KVP on the workers at the ceramic home industry "Dini-Koe" in Tlogomas of Malang. There is relationship between habit of wear a mask with KVP on the workers at the ceramic home industry "Dini-Koe" in Tlogomas of Malang. The total of dust with KVP found on the workers at the ceramic home industry "Dini-Koe" in Tlogomas of Malang.

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