SMOKE EXPOSURE AND OCCUPATIONAL RELATED WITH LUNG FUNCTIONAL CAPACITY IN COASTAL COMMUNITIES

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Abstract

Fish curing industry is generally an informal industry that is managed by the community. Regulations on health and safety protection of the workforce and the surrounding communities have received less attention. This study aims to determine the association of smoke exposure and occupation with pulmonary function capacity in coastal communities Lalonggasumeeto village. This research was an analytic observational with cross sectional study. The sample size were 118 samples with consecutive sampling techniques. Data analysis was performed using chi-square test. This study found that respondents with exposure to smoke less then and until 8 hours/day was (52.5%) and respondents with exposure to smoke more than 8 hours/day was (47.5%). Respondents work as fish fumigation as much as 50%. Respondents with normal pulmonary function capacity was (46.6%) and respondents with abnormal pulmonary function capacity found (53.4%). The analytic results showed, that were smoke exposure and occupation (p-value = 0.000), associated with lung functional capacity. These result conclude that there were association of smoke exposure and occupation with pulmonary function capacity in coastal communities. Sugested, the workers should using personal protective equipment when performing fish fumigation and home ventilations were not adjacent to the fumigation place.

Keywords: lung capacity, pulmonary function, smoke exposure, coastal communities, occupation

INTRODUCTION

The roles of human resources need to get special attention in ability, safety, and health work. Risks of hazards encountered by the workforce such as the danger of accidents and occupational diseases, due to a combination of various factors i.e labor and work environment.[1]The purpose of occupational health is as a means to improve work productivity through the improvement of worker health status. Steps taken include prevention of occupational accidents and diseases. Development of a work environment that meets health requirements, organization of labor health efforts, and regulation of health requirements for workers.[2]

One of the efforts to prevent occupational diseases is the use of personal protective equipment such as masks that fit health standards. Research in New York stated that if a mask that meets the standards is used by workers at the source of infection, the level of protection increased up to 300-fold.[3]

According to the International Labor Organization (ILO), in 2012, 100% employment-related mortality rates, 21% were due to respiratory diseases.[4] According to that condition, from the calculation of the percentage job-related mortality rate, 21% was at respiratory disease-related illness. There are about 400,000 to 3 million workers suffering from occupational lung disease in America. Some areas of Japan even reported 15% of cases of asthma are working asthma. Labor-induced lung disease or labor-induced lung disorders are considerable, although the data are lacking. Usually caused by period of work, length of exposure, type of work, irritation or toxic substances that may cause acute or chronic respiratory distress.[4]

According to research by Purnamasari (2015) stated that there was a long relationship of exposure with lung capacity to workers in Sawmill Tubeyana Wood, Belawa Subdistrict, Wajo Regency. This research showed the relationship between the working period with the

capacity of lung function. The longer the person's working period, the longer it will be exposed to particulate exposure and the particulate exposure will accumulate.[5] Previous research Fatmaulida, the main effect of smoke from limestone burning to labor in the form of lung dysfunction was both acute and chronic. Acute symptoms such as respiratory tract irritation, increased mucus production, narrowing of the respiratory tract, cilia release and mucous membrane lining and breathing difficulties.[6]

Fish curing industry is generally an informal industry, usually managed by people with very simple technology, without much touch by the laws and regulations, so that all regulations relating to the protection of health and safety of the workforce and the surrounding community are less attention. One step to overcome the acceleration of lung function impairment in limestone processing industry is to make early diagnosis, by measuring lung function, so that can be done precaution.[7] One of the centers of fish curing industry in the coastal area of Southeast Sulawesi Province, is located in Lalonggasumeeto Village, Lalonggasumeeto Sub-District, Konawe District. This fish curing industry is a hereditary effort of parents, the number of active industries as much as 23 points of fogging.[8]

The fish industry workers have a great risk of exposure to smoke through the respiratory tract. The preliminary observation results of this working fish smokers work without the use of Personal Protective Equipment (PPE), such as masks, gloves, glasses. Smoke arising may harm workers and communities living around the fog area.

The smoked fish workers complain of symptoms of coughing, spasms, and sore eyes, resulting from a smoky environment. This condition can lead to decreased lung function capacity and affect the health of the workforce.

Data of survey results from Public Health Centre of Lalonggasumeeto Subdistricts (2015), reported that the acute respiratory infections ranks number one of ten diseases most cases with amounted 459 cases.[8] The purpose of this study was to determine the association between smoke exposure and occupation with lung function capacity in coastal communities of Lalonggasumeeto village, Konawe, Southeast Sulawesi.

RESEARCH METHODS

This was an observational analytic study with Cross Sectional design. The research was conducted on May-August 2016 at Lalonggasumeeto Village, Lalonggasumeeto Sub-district, Konawe District. The population was the entire community amounted to 273 people. Samples were taken using the consecutive sampling technique. It was comprised of 59 fish and 59 non-smoked fish workers living in the area around curing, with inclusion criteria, healthy people, not heavy smokers, aged 21-45 years, working as smokers instead of smokers living in the area around the curing, and willing to participate in this research. The instruments used are questionnaire, spirometry, mouthpiece, scales, microtoice. Data analysis was by chi square correlation test.

RESULTS

Data results on Table 1 showed that the age group of respondents were 31-40 years (49.2%). The highest number of respondents was male (50.8%). Respondents who had less BMI (5.9%), normal BMI (56.8%) and overweight BMI (37.3%). Smoking behavior of respondents less than 15 stems (47.5%) and non-smokers (52.5%). Respondent with exposure time ≤8 hours/day (52.5%) and long exposure (47.5%).

The working as fish fumigation was 50.0%. Normal lung function capacity was 46.6% and the abnormal capacity was 53.4%.

Table 1. Characteristic of Respondents by Age, Sex, Body Mass Index, Smoking Behavior, Exposure Time, Occupation, Lung Functional Capacity

Characteristics	Absolute (n)	Persentage (%)
Age		
21-30 years	13	11.0
31-40 years	58	49.2
41-45 years	47	39.8
Sex		
Male	60	50.8
Female	58	49.2
BMI		
Less (< 18.5)	7	5.9
Normal (18.5-22.9)	67	56.8
Overweight (23.0-24.9)	44	37.3
Smoking Habit		
Less than 15	56	47.5
No Smoking	62	52.5
Long of Smoke Exposure Time		
≤ 8 hour/day	62	52.5
> 8 hour/day	56	47.5
Occupation		
Fish Fumigation	59	50.0
Others	59	50.0
Lung Functional Capacity		
Normal (FVC ≥ 80%)	55	46.6
Abnormal (FVC < 80%)	63	53.4
Total	**118**	**100**

Table 2 Relation of Smoke Exposure and Occupation with Lung Function Capacity in Coastal Communities of Lalonggasumeeto Village

	Lung Functional Capacity				Total		P Value
	Normal		Abnormal				
	n	%	N	%	n	%	
Long of Smoke Exposure Time							
≤ 8 hour/day	46	74.2	16	25.8	62	100	0.000
> 8 hour/day	9	16.1	47	83.9	56	100	
Occupation							
Fish Fumigation	9	15.3	50	84.7	59	100	0.000
Others	46	78.0	13	22.0	59	100	

Based on Table 2, the number of respondents with exposure time ≤ 8 hours/day was 62 (52.5%). Respondents who had normal lung function capacity of 46 respondents (74.2%) and who had abnormal

lung function capacity amounted to 16 respondents (25.8%).

Number of respondents with exposure time > 8 hours/day was 47.5%. Those with normal lung function capacity were 16.1% and those with abnormal lung function capacity were 83.9%. Based on Chi-square test results, it was obtained p-value=0.000. It could be said that there was association between long of smoke exposure with the lung functional capacity in coastal communities.

Based on Table 2, the number of respondents who worked as a smoker was 59 (50.0%). Respondents who had normal lung function capacity were 9 respondents (15.3%) and those with abnormal pulmonary fever capacity were 50 respondents (84.7%). The number of non-smoker respondents was 59 respondents (50.0%). Respondents who had normal lung function capacity were 46 respondents (78.0%) and those with abnormal lung function capacity were 13 respondents (22.0%).

Chi-square test results obtained p-value =0.000. This could be said that there was a relationship between occupation with the capacity of lung function in coastal communities of Lalonggasumeeto Village, Konawe, Southeast Sulawesi.

DISCUSSION

The problem that often occurred with regard to the coastal community was the low level of welfare of coastal communities. The low level of welfare was caused by the low purchasing power of the community which was the cause as well as the result of low education and health degree. Coastal communities in general were lack of attention to cleanliness of the work environment and the use of water resources, so it often affected by digestive and respiratory diseases. Coastal communities had an important role in the management of marine living ecosystems in coastal areas.[9]

Lung disease was due to smoke informal industries had symptoms and signs that were similar to other lung diseases that were not caused by dust in the work environment. Enforcement of the diagnosis needed to be a careful history including work history and other matters related to the worker, because new diseases arose after long the exposure.[10] Other factors such as smoking could affect lung function capacity. Theoretical activity of smoked fish and smoking habits would have a cumulative impact on the risk of impaired lung function, since particles of combustion smoke and cigarette smoke such as carbon dioxide, nitrogen dioxide, tar and other chemicals would stimulate mucus secretion and paralyzed cilia plaques in respiratory tract that actually served as a filter air entering the nose so that pulmonary dust removal mechanism could be disturbed.[6] In addition, to the ingredients that enter into the lungs then the human factor was very important to be taken into account. Pulmonary defense systems, both antagonist and physiologically, were a good mechanism for protecting the airways and lungs. This mechanism could be disrupted, either by innate factors or by the environmental factors.[6]

This study was in line with Asna's research (2013) that showed a very significant relationship between long exposure to coal dust and decreased pulmonary function capacity.[10]The duration of smoke exposure also affected the increase in alveolar diameter. The burning process would release the mediator responsible for the occurrence of damage to the network.[12] Gases and particles in the smoke would disrupt the function of alveolar cells present in intralveolaris septum. Type I alveolar cells that played a role in air exchange would swell and broke. Type II alveolar cells that produced surfactant fluid to reduce the surface tension of the alveoli would be reduced so that it was difficult to stretch during the inspiration and would collapse during the expiration.[11]

The results of this study indicated that was association between occupation with lung function capacity in coastal communities of Lalonggasumeeto Village (p=0.000). According to Asna (2013), workers were at high risk of exposure to dangerous coal dust because every day they worked in dusty environments and the dust would be inhaled into the lungs causing a decrease in pulmonary function capacity.[10]

Research conducted by Fathmaulida (2013) obtained Total Suspended Particular (TSP) levels from PM10 decreased its distance from the source from a distance of 500 m to 5,000 m. If the

community resided ≤ 1000 m2 from the work environment, there would be exposure risk from the distance of the house. The presence of PM10 levels in the working environment had a risk of exposure to dust not only to workers, but to the community around.[6]

There were relation of long-standing exposure to smoke and occupation with lung function capacity in coastal communities of Lalonggasumeeto Village, Konawe District. It was needed to do research about the influence of air pollution on lung function with the measurement of each type of pollutant, so that it could be known the effect of air pollution on body physiology function.

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