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Inflammatory Response and Lung Function Toward Illness Perception of Poultry Farm Workers

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ABSTRACT

The poultry farm workers should aware to the risk of respiratory disorders. The illness perception represents belief about health condition of the body. The inhaled organic particles at poultry farm area could trigger chain of immunological reactions that begin from the release of neutrophil and lymphocyte up to fibrogenesis resulted in pulmonary dysfunction. The aim of this study was to identify the association between inflammatory response and lung function with illness perception of poultry farm workers. The study used observasional analytic methods with cross sectional design. One hundred and five poultry farm worker were taken as samples which obtained by purposive sampling methods. Illness Perception Questionnaire-Occupational Respiratory Disorder Risk (IPQ-ORDR) was used to measure the illness perception while the inflammatory response was measured by neutrophil levels. The lung function examination resulted in several lung function parameters (FEV1, FVC and FEV1 to FVC ratio). The results showed that there was no association between the inflammatory response and illness perception ($p = 0.228$) and the lung function was associated with illness perception ($p = 0.001$). The illness perception is not always match with the actual respiratory health conditions in poultry farm workers. It is needed to provide more information on the risk of respiratory disorders to the poultry farm workers.

INTRODUCTION

Working at chicken poultry farm has the risk of the exposure of dangerous organic materials. The risk of poultry farm workers to clinically get respiratory disorders is higher than other workers. The dust in poultry farm industry could trigger to the pulmonary and respiratory track diseases and complication, for example asthma, Chronic Obstructive Pulmonary Disease (COPD), Allergic Alveolitis, and Organic Dust Toxic Syndrome (ODTS). There were some evidences that shown correlation between workplace exposure and several variations of respiratory disorder symptoms, acute to chronic, complained by the workers (Viegas et al., 2013).

There were about 235.000.000 people all around the world suffered from asthma due to the workplace in 2011, 250.000 of them was anually reported died. The prevalence of ODTS was

found around 10%-30%. Poultry farm workers were grouped by World Health Organization (WHO) as agricultural workers. More than 5 million populations in USA were epidemiologically involved in agricultural workers meanwhile in developing countries there were about more than 70% population. Respiratory disorder was the main health problem of that kind of workers (Okiki et al., 2018).

Immunologic reaction triggered by inhaled organic dust in the poultry farm area began when the dust was catched by Alveolar Macrophage. Activated Alveolar Macrophage then orchestrated another several immunologic reaction, from release of the neutrophil and lymphocyte up to fibrogenesis, which could cause respiratory disorders. The immunologic reaction could be followed and unfollowed by acute respiratory disorders symptoms (Susanto & Ikhsan, 2017).

The composition of particle like allergen, endotoxin, peptidoglican, and several gases will always threatening the workers. Repeated and excessive exposure of the particles could damage all over respiratory track. Prolonged neutrophilia and lymphopenia in the acute phase could cause tissue damage and organ failure. Sign and symptoms of the disease could be slow but tend to cause chronically inflammatory response with all of the sequences (May et al., 2012).

It was cautious to do early action according to the risk and big long term outcome for poultry farm workers as explained before, especially if the illness perception and symptoms were experienced among them. The workers cautious action was influenced by illness perception among them. Illness perception represented someone cognitive behavior or beliefs among illness or health condition that experienced themselves. Illness perception could determine someone treatment plan among diseases, for example what action that should be early done or not (delaying action). Illness perception is related to health outcome (Sawyer et al., 2019).

Studies by Budijanto and Roosihermiatie (2006) explained that people in seaship harbor area were not perceipt ill when they still could work and prefer to medicate themselves. They looked for help from health workers when their condition didn`t improve. Preliminary research among poultry farm workers were shown that all of them didn`t feel ill although several of them were actually often had respiratory symptoms like cough, dyspnea or purulence of sputumsince they still can do work at their best in that condition.

Neutrophil was one of the parameters that could be easily used to detect inflammatory status of a patient and also became lung function examination (FEV1, FVC and FEV1 to FVC ratio) which could show lung function disorders of a patient too. Based on that, the information was needed to show whether the illness perception own by poultry farm workers were consistent with their health condition, especially inflammatory response and lung function. This study aimed to find out the correlation of inflammatory response, lung function, and illness perception of poultry farm workers.

RESEARCH METHODS

This study used observational analytic methods with cross sectional design. The population in this study was all of poultry farm workers of Citra Mandiri Farm in Kademangan Sub-district Regency of Blitar. The sample was taken by purposive sampling design based on the inclusion criteria comprises of adult age (15 to 65 years old), working at poultry farm was the main

occupation, worked for 5 years minimum with the duration of work between 4 to 12 hours each day, had the ability to read and write. The total sample acquired was 105 persons. The data were taken by demography data questionnaire consisted age, education, sex, height, weight, history of past illness, history of occupation, and history of smoking. Illness perception was measured by Illness Perception Quesioner-Occupational Respiratory Disorder Risk (IPQ-ORDR) that developed by the researcher based on the assessment aspect of The Brief Illness Perception Questioner (B-IPQ) which included consequences, timeline, personal control, treatment control, identity, concern, coherence, Emotional representation, and causal. IPQ-ORDR consisted nine questions and converted into scale begin from 0 (minimum) to 10 (maximum) then categorized into well (score $\geq$ 45) and unwell (score < 45). Inflammatory response was measured through neutrofil levels. Neutrophil is a leucocyte subset that acquired from differential count in complete blood count examination. Lung function examination was resulted in several lung function parameters (FEV1, FVC and FEV1 to FVC ratio). Lung function was categorized as normal when all of the three lung function parameter examined (FEV1, FVC and FEV1 to FVC ratio) had normal value and vice versa. Complete blood count examination was done by using blood flowcytometer meanwhile lung function was examined by autospirometri that had serial calibrated and collaborate with accredited laboratory institute. FEV1 classifications use SEPAR (Spanish Society of Pulmonology and Thoracic Surgery) and neutrophil blood content was categorized normal when the value was in within normal limit (50 to 70% from total leucocyte value). The data were analyzed by using distribution of frequency and coefficient of contingency. This research had been approved by Ethical Committee in Research and Development Institutional Board at Medical Faculty of Airlangga University/Dr.Soetomo Teaching Hospital of Surabaya with number of ethical clearance is 1238/103/IV/2019. The research was done at the end of June 2019.

RESULTS

One Hundred and five persons with different duration of work were acquired in this research. Permanent workers worked around 7 to 10 hours each day, responsible to raise the chicken and clean the henhouse, meanwhile part time workers worked around 4 to 6 hours each day, responsible in picking up the eggs and feeding the chicken. All of the workers were used to live in village where poultry farm was located except 4 persons that were used to live inside poultry farm area.

The 105 subjects in the study were consisted of 68 men workers (65%). The biggest age range was (46 to 65 years old) around 68 workers (65%). Mean Body Mass Index (BMI) was 23 kg/m2, 79 workers (75%) had normal BMI (18,5 to 24,9 kg/m2). More than half of the workers had worked at poultry farm more than 10 years; moreover 31 workers (30 %) had worked more than 21 years. As much as 74 workers (70%) had the duration of work between 4 to 6 hours each day. 63 workers (60%) never smoke. For more detailed information displayed on tabel 1.

Tabel 1. Demographic Data of the Poultry Farm Workers in CV Citra Mandiri Farm (n=105)

No	Characteristic		Frequency (F)	Percentage (%)
1	Sex	Male	68	65
		Female	37	35
2	Age (years)	17-25	15	15

No	Characteristic		Frequency (F)	Percentage (%)
		26-45	11	10
		46-65	68	65
		> 65	11	10
3	BMI (kg/m²)	<18,5	5	5
		18,5-24,9	79	75
		25-29,9	16	15
		>30	5	5
4	Length of work (years)	5-10	48	45
		11-20	26	25
		≥21	31	30
	Duration of work (hours/day)	4-6	74	70
		7-9	26	25
		≥10	5	5
5	Smoking history	Having no	63	60
		Had quit	11	10
		smoking	31	30

Neutrophil content in the serum could become the sign of inflammatory status and as predictor of tissue damage. Lung function was interpreted based on normal value of FEV1, FVC and FEV1 to FVC ratio.

Tabel 2. Neutrofil to Limfosit Ratio, Lung function and Illness Perception (n=105)

Variables		Σ	%
Neutrophil (% Leucocyte)	Within normal limit (50-70)	63	60
	Outside normal limit	42	40
Lung function	Normal	65	62
(FEV1, FVC, FEV1 to FVC Ratio)	Disorder	40	38
Illness Perception	Well	93	89
	Unwell	12	11

Table 2 showed that around 60 % workers had neutrophil value within normal limit, 62% workers didn`t have lung function disorders, and about 89 % workers didn`t feel ill on their body or no respiratory disorders. Lung function was interpreted from FEV1, FVC and FEV1 to FVC Ratio value. If all of theparameters showed normal value, the lung function was cathegorized as normal. The result of coefficient of contingency variable and illness perception toward neutrophil and lung function could be seen on table 3.

Tabel 3. Neutrophil and Lung Function Related with Illnes Perception

Variable	Illness Perception				contingency coefficient	
	Well		unwell			
	Σ	%	Σ	%	value	Approx.Sig
Neutrofil (% Leukosit)						
Within normal limit	56	53	4	4	0,160	0,228
Outside normal limit	38	36	7	7		
Lung Function						
Normal	65	62	0	0	0,407	0,001
Disorder	28	27	12	11		

Tabel 3 showed significant correlation between lung function and Illness Perception (P=0,001), which about 62% workers had normal lung function and feeling well on their illness perception. There were around 27 % workers had lung function disorders but felt well at their illness perception. Around 36 % workers had neutrophil value outside normal limit but still felt well on their illness perception. In other hand although there was significant correlation but the correlation was weak, showed by value 0,407. The correlation between neutrophil and illness perception was not significant (p=0,228).

DISCUSSIONS

There were around 40 % poultry farm workers had neutrophil value outside normal limit but this percentage was big enough. The increased of neutrophil content was caused by proinflammatory cytokines effect, complement activation, and neutrophil chemotactic activity as the result of organic dust exposure, for example animal fur, seeds dust, protein in animal excreta (West, 2013).

Based on the coefficient of contingency there was no significant correlation between illness perception and neutrophil content (p=0,228). This could be explained that the increased of neutrophil as sign of acute inflammatory response often did not show respiratory disorders symptoms. Complaints that were not felt then forming poultry farm workers illness perception in which suggested them to feel well/not feel ill. Illness perception in this study was someone subjective beliefs and emotional response among risk of occupational respiratory disorder. Illness perception affected individual behaviour in determine their treatment plans (Lorensia & Lisiska, 2011).

The increased of neutrophil blood content generally followed by the increased of disorders value of FEV1 to FVC Ratio. FEV1 to FVC the ratio disorders was one of the result from respiratory tract inflammation that caused by the increased of activated blood neutrophil (West, 2013). There were 24 workers had outside normal limit neutrophil content, only 4 workers had unwell illness perception. All of the four workers were detected with lung function disorders and felt respiratory disorders symptoms too like cough, dyspnea or purulence of sputum. Meanwhile the other twenty workers some of them were not detected with lung function disorders or the result showed disorders but according to their assessment they didn't feel respiratory disorders symptoms that disturbed their working activity.

The condition above showed us that theincreased of blood neutrophil content was not always correlated with lung function disorders. According to Rhee et al. findings (2018), neutrophil blood content was not correlated with lung function (FEV1, FVC). Factors that underlie that difference were BMI and age; BMI and age in this research were varied. Interesting finding in this research was there were two workers had neutrophil content within normal limit but felt ill. Neutrophil was not the only one sign of the inflammatory predictor at the respiratory track. Another inflammatory predictor were eosinophil and lymphocyte that often followed by lung function disorders and respiratory symptoms like cough, dyspnea. That findings were consistent with Baur findings (2012) which got accumulation of lymphocyte content in poultry farm workers correlate with FEV1 value disorders, and from Hancox et al. (2018) that finding high eosinophil content correlated with lower value of FEV1 to FVC Ratio and FEV1.

Illness perception and lung function were significantly correlated with weak correlation (p=0,001). There were about 62 % workers had normal lung function and well illness perception. Normal lung function was represented that all of the lung function parameters were within normal limit so that the workers didn`t feel any symptoms (FEV1, FVC dan rasio FEV1/FVC). The absence of respiratory disorders symptoms was that made the scoring result among nine aspects of illness perception were low (include well cathegory), especially at the aspect of asking about symptoms like identity, concern, coherence, emotional representation, and causal. Research from Jorgensen & Bergquist (2008) showed the correlation between symptoms and illness perception, which someone with symptoms had higher score at identity/symptoms and coherence aspects.

In opposite to the statement above, there were 15 workers (27 %) had indicated lung function disorders but had well illness perception. Lung function disorders consisted of obstructive lung disorders and restrictive lung disorders that were with several variation of clinical sign and symptoms. Some of the workers felt suitability between lung function disorders and clinical sign and symptoms but others felt vice versa. Incompatibility between clinical condition and lung function affected by several factor like age that correlated physiologically with the decreased of lung function and physical tolerance when lung function measurement was examined. Lack of cooperation and poor understanding of the instructions within lung function examination could interfere lung function result (Ponce & Sharma, 2019).

Health information could influence subjectively the view of workers among beliefs and emotional response related to symptoms they felt. Based on the illness perception aspects, health informations were mainly determined by consequences, timeline, personal control, and treatment control aspects. Poultry farm workers in this research were generally not received enough health information especially about occupational respiratory disorders risk so that they tended to ignore the respiratory symptoms that sometimes they felt. Katavic et al. (2016) proposed that health information correlated with illness beliefs and illness feelings. Illness perception was determined by coping strategy and health outcomes.

CONCLUSION

Illness perception was not correlated with the inflammatory response but was related to lung function. It was caused by the immunologic reaction could followed and unfollowed by acute respiratory disorders symptoms. Illness perception was not always in matched with the actual respiratory health conditions of poultry farm workers. It is needed to give more information about occupational respiratory disorders to the poultry farm workers so that they can be more cautious in response to the complaints of the illness or to form a healthy illness perception.

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