

Analysis of Factors Associated with Occurrence of Anemia on Male Farmer using Pesticides, PPE in Brumbun Village, Maduran Sub-district Lamongan District

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ABSTRACT---- *Early detection of pesticide poisoning and anemia is to prevent the onset of chronic health problems and death. The incidence of pesticides poisoning in farmers affected by many factors both by environment and behavioral factors farmers themselves in every contact with the pesticide. Research objective is to identify factors associated anemia in male farmers who use pesticides in the Brumbun village Maduran District of Lamongan. Research method was an observational analytic cross-sectional observational approach. Population and sample are all male farmer pesticide applicators 144 people in the Brumbun village farmer groups Maduran District of Lamongan. The sampling technique used was purposive sampling method. Research results wearing of personal protective equipment (PPE) while spraying on the incidence of anemia in 67.9% of the farmers wearing incomplete PPE, <5 types of PPE. The number of pesticides kind with the incidence of anemia was 56.6% using one kind of pesticide. Spraying duration with anemia of 79.2% categorized as good ≤ 3 hours / day spraying duration, anemia occurrence is 60.4%. There is no significant relationship between the wearing of PPE in the occurrence of anemia among farmers with the p-value of 0.445. There is no significant relationship between number kinds of pesticides with anemia with a p-value of 0.270. There is no significant relationship between the spraying duration with anemia with a p-value of 0.665. Suggestions conducted periodic inspection by health center, counseling and training from the health department and the department of agriculture.*

Keywords---- Pesticides, Farmer, PPE, anemia, Lamongan,

1. INTRODUCTION

Pesticide is a liquid to kill pests that are commonly used in agriculture. According to the FAO pesticide is any substance or mixture that is expected as a preventive, destroy or control any pest, including vectors of disease in animals and in humans, crops that do not preferred or weed in the production process. In 1984 Indonesia consume 20% of world pesticide market share, in the period 1982-1987 there was an increase pesticide use by 36% compared to the previous period, while herbicides increase reached 70% and the total insecticide use in 1986 reached 1,723 tonnes, which means each hectares agricultural land use 1.69 kilograms insecticides.^[3] WHO collected data annually to indicate 500,000 to 1,000,000 people around the world have experienced a pesticide poisoning and about 500-1,000 people per year of who suffered fatal effects such as cancer, disability, infertility and disorders of the liver. Uncontrolled use of pesticides will cause a variety of health problems and environmental pollution. The use of pesticides is affected by toxicity, volume and exposure level significantly affect health. The higher toxicity of the pesticides being used more signs or symptoms of poisoning experienced by farmers.^[1]

Lamongan is one of most productive in rice producing districts, in East Java the second position after Jember and followed by Bojonegoro. Lamongan with an area of 134.14 thousand hectares crops (7.04 percent) to one of the mainstays of East Java in producing rice commodities. One village in Lamongan is Brumbun village. Brumbun Village is a village that is very productive in rice production. Most of the farmers while working for pest control do not always wearing personal protective equipment (PPE) such as masks, gloves, hats, boots, clothes that can cover their body.^[2]

Many complaints occurred after farmers spray crops in the fields, are perceived by farmers as a case of poisoning in 2004. Complaints which are often perceived symptoms such as nausea, dizziness, diarrhea, and vomiting. The symptoms are considered to be something common. In addition to cases of poisoning, in 2009 the district health office has conducted blood sampling in the field to cholinesterase level checks to farmers as pesticide user numbering 30 people. The results of the examination to blood samples there are 4 people who are indicated have mild exposed and 26 people with normal blood samples.^[3]

Research objective is to determine the factors associated with the occurrence of anemia in male farmers who use pesticides, PPE in Brumbun Village, Maduran, Lamongan District.

2. MATERIALS AND METHODS

Materials and instruments

Blood with anti coagulant K2EDTA and spreadsheet (a list of questions regarding the use of personal protective equipment, hand washing, and duration use of pesticides). Cyanide reagent composition: K3Fe(CN)6: 200 mg, KCN: 50 mg, KH2PO4: 140mg, Non isotonic detergent: 0.5 to 1 ml, Aquadest : 0.5 to 1 ml, Standard HICN that each levels: 27.1 mg / dl, 59.1 mg / dL, 78.6 mg / dL, 228.5 mg / dL.

Research instrument

The instrument used in this study: test tube, automatic pipette 20 µl, semi-automatic pipettes (dispenser) 5 ml and spectrophotometer. The research independent variables are kind of pesticides, duration of pesticide usage and personal protective equipment. The dependent variable is anemia in farmer pesticide applicators in the Brumbun village, Maduran, district of Lamongan.

Method

The study design was observational analytic cross-sectional approach, observation or data collection at once at a time (point time approach).^[8] Population and Sample are all male farmer pesticide applicators 144 people who there in the Brumbun village farmer group, Maduran, district of Lamongan. The sampling technique used was purposive sampling method.

Research Procedures are Preparation, Execution, and Reporting. Research conducted by collect research data from blood hemoglobin examination to research subject in September 2014 includes activities such as:

1. Interviews using respondents to fill in the data in the spreadsheet
2. Examination of using blood hemoglobin level examination techniques Cyanmethemoglobin method. Principle Hemoglobin is converted into methemoglobin by K3Fe(CN)6 then by KCN is converted into hemoglobin cyanide (HICN). The addition of KH2PO4 aims to regulate the pH of the solution, while the addition of "non isotonic detergent" aims to accelerate the lysis of erythrocytes and reduce turbidity HICN happened. The color intensity that formed, its absorbance was measured using photometer absorbance at wavelength of 540 nM.
3. Preparation of standard curve
 - a. Using a pipette add 5 ml of each reagent cyanide solution into 4 pieces of test tubes
 - b. Added 20 µl of standard solution HICN owned by their respective levels of 27.1; 59.1; 78.6; 228.5 mg / dl.
 - c. Mixed until homogeneous, then let stand for 3 minutes.
 - d. Read absorbance using photometer at a wavelength of 540 nm using cyanide solution as a blank.
 - e. Results obtained absorption measurement calculated against a standard concentration and obtained factor (f).
4. The level of hemoglobin measurement
 - a. 5 ml of reagent cyanide inserted using a pipette into a test tube.
 - b. Added K2EDTA 20ul blood sample, mix until homogeneous, allowed to stands for 3 minutes.
 - c. Read absorbance using photometer at a wavelength of 540n m with a cyanide solution as a blank.
 - d. The results obtained uptake calculated by multiplied by a factor obtained.

3. RESULTS AND DISCUSSION

Male farmers who use pesticides in accordance with inclusion so that the respondents in this research are 53 farmers. Two types of pesticides are insecticides and herbicides that use in appropriate dose has been determined as:

- a. Dilution adjusted to a concentration or dose recommended in the package.
- b. When mixed with other materials, always pay attention to the instructions and labels.
- c. Characteristics of research respondents such as age, education and tenure male farmers in the Brubun village, Subdistrict Maduran can be seen in Table 1 below:

Table 1 Characteristics Research Respondents

Respondent Characteristic	Number	Percentage (%)
Age		
20-29 year	23	43,39
30-39 year	11	20,75
40-49 year	11	20,75
50-60 year	8	15,09
Total	53	100

Education		
Elementary School	27	50,94
JHS	13	24,52
SHS	13	24,52
Total	53	100
Farmer as Pesticides Applicator		
≤1 year	11	20,75
2-5 year	14	26,41
6-10 year	11	20,75
>10 year	17	32,07
Total	53	100

Univariate analysis

Wearing of PPE

The results of the distribution of wearing personal protective equipment at the farmer pesticide applicators can be seen in Table 2.

Table 2 Results of the frequency of wearing personal protective equipment at farmer pesticide applicators

No	Category	Total
1	Complete	17
2	Incomplete	36

Based on the interviews, farmers often forget to wear PPE while spraying because of the demand to work fast. The personal protective equipment worn by farmers as a complete (≥ 5 PPE) such as long sleeves, pants, masks, hats, gloves and boots.

Number Type of Pesticide

The results of the distribution of the amount of pesticides used by farmers in the village brumbun Maduran subdistrict, District of Lamongan can be seen in Table 3.

Table 3 Results of the distribution of the amount of pesticides used by farmers

No	Category	Total	Percentage (%)
1	Herbicide or Insecticide	30	56,6
2	Herbicide and Insecticide	23	43,4
	Total	53	100

Based on the interviews, most respondents use pesticides depend on the type of problems that occur on farms. Most farmers were just complaining about one problem such as weeds so that dominant pesticide to be used is only one Herbicide. The used of herbicides by farmers because of the weed/ competitive plants that can ruin agriculture.

Duration of Spray

Distribution results of duration of pesticides use. In brumbun village, Maduran sub district , District of Lamongan can be seen in Table. 4.

Table 4 Distribution results of duration pesticides spraying

No	Category	Total	Percentage (%)
1	Good (<3 hour)	42	79,2
2	Bad (>3 hour)	11	20,8
	Total	53	100

Based on the interviews, most respondents expressed that duration of pesticides use depending on the area of pesticide sprayed in their fields.

Occurrence of Anemia

Table 5 Distribution results of the anemia occurrence in farmers who use pesticides

No	Category	Total	Percentage (%)
1	Anemia	9	17
2	Normal	44	83
	Total	53	100

Bivariate analysis

1. The relationship between the wearing of PPE in the occurrence of anemia among farmers in the District of Maduran brumbun Lamongan

Table. 6 The relationship between the wearing of personal protective equipment to the occurrence of anemia in farmer pesticide applicators

No	Wear PPE	Anemia Incidence				Total		p - (value)
		Anemia	%	Not Anemia	%	∑	%	
1	Complete	4	23,5	13	76,5	17	100	0,445
2	Incomplete	5	13,9	31	86,1	36	100	
	Total	9	17	44	83	53	100	

This study has a value expected count <5, then used Fisher's Exact test with $\alpha = 0.05$ so that the results obtained from the analysis of the p-value of 0.445. P-value > 0.05 means that there is no significant relationship between the wearing personal protective equipment against anemia. Pesticides are generally a contact poison, hence wearing of personal protective equipment to farmers when the spraying is very important to avoid direct contact with the pesticide. One of the main factors in a person's exposure to pesticides is wearing of PPE. One thing that is often overlooked by farmers (in tropical countries) generally is a contact poison. Therefore, entry route through the skin is very effective. Especially if there are abnormalities in the skin and / or through perspiration, absorption of pesticides through the skin will be more effective.^[2,4,6]

The absence of a relationship between the completeness of PPE with the occurrence of anemia may be affected by a lack of PPE quality that be worn also because of other determining factors, called determinants such as the direction of the wind in field and the ambient temperature while spraying. According to Efendi (2009) to make the attitude becomes a real actions required supporting factors or conditions that would allow such a facility.^[5]

2. The relationship between the kind of pesticides with anemia in the Brumbun Village Maduran District of Lamongan

Tabel.7 relationship between the kind of pesticides with anemia

No	Pesticides	Occurrence of anemia				Total		P - (value)
		Anemia	%	Normal	%	∑	%	
1	One kind	7	23,3	23	76,7	30	100	0,270
2	Two kind	2	8,7	21	91,3	23	100	
	Total	9	17	44	83	53	100	

Considering there are cells that have the value expected count <5, then used Fisher's Exact test with $\alpha = 0.05$ so that from the analysis results in get the p-value of 0.270. P-value > 0.05 means that there is no significant relationship between the numbers of kind of pesticides on the occurrence of anemia.

Farmers in spraying also did not consider the content of acids and alkalis in pesticide. After the measurement of acid and alkaline pesticides using litmus paper known that there are farmers who mix acidic pesticides with alkaline pesticides. Mixing of acidic pesticides with alkaline pesticide for spray will form crystal, so that may cause obstruct to the sprayer equipment. And then rest of the mixed pesticides discarded by farmers and may lead to environmental pollution.^[9,6]

Meanwhile, the greater number kind of pesticides of the mixture which farmers use the more easily these farmers poisoned. Moreover, if use of high dose of pesticides and mixtures more than 3 kind of pesticides. Pesticides can enter through the hand skin of farmers, and can be inhaled by the farmers so as farmers suffered pesticide poisoning.^[7,10]

3. The relationship between duration of spraying to occurrence of anemia in farmers Brumbun Village, Maduran District of Lamongan

Tabel.8 The relationship between duration of spraying to occurrence of anemia

No	Duration of Spraying	Occurrence of anemia				Total		P - (value)
		Anemia	%	Normal	%	∑	%	
1	Good	8	19	34	81	42	79,2	
2	Bad	1	9,1	10	90,9	11	20,8	0,665
	Total	9	17	44	83	53	100	

Of all the respondents showed that duration of spraying pesticides by farmers most of them in good duration and not anemic. Considering there are cells that have the value expected count <5 , then use Fisher's Exact test with $\alpha = 0.05$ so that the results obtained from the analysis of the p-value of 0.665. P-value > 0.05 means that there is no significant relationship between duration of spraying on the occurrence of anemia.

Bad ambient temperature for farmers to spray pesticides is if temperature higher than human body temperature is 27°C. If the ambient temperature is high, the body temperature will increase. High body temperature that will cause vasodilation of blood vessels expand to adjacent skin (external environment) that enables heat freed out, more blood flow to the skin so easier heat liberated out through the irradiation process and perspiration, the sweat released by the sweat glands ave particular temperature so as to absorb the high heat from the body and liberate to environment when sweat evaporates.^[11]

4. CONCLUSION

The results showed there is no factors associated with the occurrence of anemia in male farmers who use pesticides, PPE Brumbun village Maduran District of Lamongan.

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