JOURNAL OF PUBLIC HEALTH FOR TROPICAL AND COASTAL REGION (JPHTCR)

Journal homepage: http:/ejournal2.undip.ac.id/index.php/jphtr/index

ISSN : 2597-4378

Research Article

Relation between Pesticide Exposure and Hypertension Incidence among Sprayers of Jasmine Farmers in Kaliprau Village, Ulujami District, Pemalang

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Abstract

Background*: The use of pesticides in Kaliprau Village is not following the dosage required in the packaging label with the frequency of spraying 3-4 times per week. Spray farmers mix more than two types of pesticides and when spraying do not use personal protective equipment (PPE). The incidence of hypertension in Kaliprau Village in 2016 was 524 people and increased in 2017 to 843 people. The purpose of this study was to determine the relathionship between pesticide exposure and hypertension* **incidence among sprayers of** jasmine farmer in Kaliprau Village, Ulujami District, Pemalang.

Methods*: This research is observational analytic using a survey method approach with cross-sectional design. The sample in this study was 102 respondents with data analysis using Chi-Square.*

Results*: Data analysis shows that there is a relationship between years of work (p = 0,000). While the frequency of spraying (p = 0.574), spraying time (p = 0.739), length of work (p = 0.721), wind direction (p = 0.171), pesticide dose (p = 0.145), dilution method (p = 0.448), method storage (p = 0.648) not related to hypertension.*

Conclusions: *there is a relationship between the length of service and the incidence of hypertension among* **sprayers of j**asmine farmer *in Kaliprau Village, Ulujami District, Pemalang District.*

Keywords *:pesticide exposures, the incidence of hypertension,* ***sprayers of*** *jasmine farmer*

Article History : *Received : 28 th October 2019 ; Revised : 7th November 2019 ; Accepted: 9th December 2019*

Background

Hypertension is a condition where increased blood pressure gives continue symptoms in the target organ of the body and do severe damage such as stroke, coronary heart disease and narrowing of the left ventricle. Hypertension can also cause kidney failure and other vessel diseases.[1] Farmers become a risk group because during the work they get contact with objects or materials that cause rising blood

pressure, which is toxic chemicals in pesticides. [2] Pesticides are chemicals that are used to protect plants from pests. Pesticides play a role in controlling or killing pests.[3,4] Pesticides that enter the human body cause adverse effects on health, from mild to severe. Health problems caused by pesticides are poisons. The mildest effects of pesticide poisoning are headaches, nausea and vomiting, muscle aches, cramps, respiratory system disorders, reproductive system disorders, impaired liver function, immune disorders, cancer, and most fatal is death.[5] Pesticide poisoning can be checked by blood pressure.

Pemalang is a regency in Central Java Province which is located on the north coast of Java Island. The agricultural sector with 38,617 hectares of paddy land and 23,813 hectares of dry land is still the backbone of the economy in the Regency, one of which is in the Ulujami District. This area has 60.55 km² and is a lowland area consisting of 18 villages. The Livelihoods of the population are dominated by farmers, although there are also fishermen. This condition has caused Ulujami District to become a region with a high dependence on pesticides. One of them is Kaliprau Village. [6] The purpose of this study was to determine the relationship of pesticide exposure and hypertension incidence among sprayers of jasmine farmer In Kaliprau Village, Ulujami District, Pemalang. *pesticide exposure and hypertension* incidence among sprayers of jasmine farmer.

Methods

The population in this study were sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang Regency, 121 farmers with samples 102 farmers. The type of research is analytic observational using a survey method with a cross-sectional design.

Results

Characteristics of respondents

Sprayers of Jasmine farmer in Kaliprau Village have an average of age are 45 years with the youngest age is 23 years and the oldest age is 65 years. The average systolic blood pressures are 140.22 mmHg with the lowest systolic blood pressure is 118 mmHg and 159 mmHg the highest. While the average of diastolic blood pressure is 91.05 mmHg with the lowest diastolic blood pressure are 76 mmHg and 106 mmHg are the highest.

History of Pesticide Exposure

Results of table 1. Show that frequency of spraying on sprayers of jasmine farmer in Kaliprau Village was in the good category 37 (36.3%), while the bad category was 65 (63.7%). Time spraying with a good category is 92 (91.1%), while the bad category is 10 (8.9%). The duration of work was 45 (44.1%) in the good category, while the bad category is 57 (55.9%) The working period with a new work period of 39 (38.2%), while the old work category was 63 (61.8%). The dosage was 37 (36.3%) according to the packaging label recommendations, while 65 (63.7%) did not match the recommended label packaging. The direction of the wind was 31 (30.4%) in the good category, while the bad category was 71 (69.6%). The use of PPE shows that all respondents did not use PPE in full. How to dilute the pesticides that fulfill the requirements as many as 60

(59.9%), while those who do not match with the requirements are 42 (40.1%). The method of storing pesticides 61 was eligible (69.6%), while 41 (30.4%) were not eligible.

Table 1. Distribution of Pesticide Exposure History

Variable	f(person)	%
Spraying Frequency		
Good (≤2 times a week)	37	36,3
Bad (>2 times a week)	65	63,7
Total	**102**	**100,0**
Spraying time		
Good (≤ 09.00)	92	91,1
Bad (> 09.00)	10	8,9
Total	**102**	**100,0**
Duration of work		
Good (≤ 2 hours)	45	44,1
Bad (> 2 hours)	57	55,9
Total	**102**	**100,0**
Years of work		
New (≤ 10 years)	39	38,2
Old (> 10 years)	63	61,8
Total	**102**	**100,0**
Doses		
Match with the label	37	36.3
Not match with the label	65	63.7
Total	**102**	**100,0**
Direction		
Match with the direction of a wind	31	30.4
Opposite with direction of a wind	71	69.6
Total	**102**	**100,0**
Use of PPE		
Complete	0	0
Not complete	102	100.0
Total	**102**	**100,0**
Dilution method		
Qualify	60	59.9
Not qualify	42	40.1
Total	**102**	**100,0**
Use of PPE		
Qualify	61	69.6
Not Qualify	41	30.4
Total	**102**	**100,0**

Analysis of the Relationship between Pesticide Exposure and hypertension

Based on the results of the study, obtained the frequency of spraying farmers is> 2 times a week with a bad category of 65 (63.7%). This is because the spraying frequency of farmers is not a recommendation, which is a maximum of spraying are 2 times a week. The results were obtained statistically by Chi-Square Test that there was no significant difference in the frequency of spraying with the incidence of hypertension (p-value = 0.574). This study is in line with research by Kusuma Dara which there is no significant difference between the frequency of spraying and systolic blood pressure in spraying farmers. Based on the results of the study, spray time below 9 am with a good category is 92 (91.1%). The results were obtained statistically by Chi-Square Test that there was no significant difference in spray time in the incidence of hypertension (p-value = 0.739). The time of spraying pesticides is related to the ambient temperature, which can cause more perspiration, especially during the daytime, and it will be easier for pesticide poisoning absorbed through the skin[7] Duration of work in the poor category was 57 (55.9%). The results obtained statistically Chi-Square Test that there is no significant difference in the duration of time a farmer works with the incidence of hypertension (p-value = 0.721). The proportion of medium poisoning farmers who had spraying time per day for more than 2 hours (31.4%) was greater than the proportion of medium poisoning farmers who had spraying time per day less than or equal to 2 hours (23.8%). [8]

Table 2. Relationship of Pesticide Exposure to hypertension

Variables	Incidence of Hypertension	
	p-value	RP
Spraying Frequency	0,574	1,269
Spraying time	0,739	1,178
Duration of work	0,721	1,188
Years of work	0,000	0,470
Direction	0,171	1,245
Dosage	0,145	0,789
Use of PPE	--	--
Dilution method	0,448	1,141
Mixing method	0,648	1,095

*Uji *Chi-square with continuity correction*

Years of work with a category of long work> 10 years are 63 (61.8%). The results were obtained statistically with the Chi-Square Test, which is a significant difference in years of works of farmers with a category of years of work> 10 years with a value of p = 0,000.

Based on the results of the study, wind direction when spraying with a bad category is 71 (69.6%). The results were obtained statistically by Chi-Square Test that there was no significant difference in the direction of the wind with the incidence of hypertension (p = 0.171). Wind direction

must be considered by spraying farmers when spraying. Spraying is good if in the direction of the wind with the speed should not exceed 750 meters per minute. Farmers who go downwind at the time of spraying will have a greater risk compared to farmers who when spraying crops in the direction of the wind.

Based on the results of the study, it was found that the dosage of pesticides used by farmers was not following the recommended labeling are 65 (63.7%). The results were obtained statistically with the Chi-Square Test, that there was a significant difference in the dose with the incidence of hypertension (p = 0.145). The use of PPE of farmers who are incomplete are 102 respondents (100%). The results of the study could not be analyzed with the Chi-Square Test because all respondents were incomplete in using PPE. Kusuma Dara's research stated that there was a significant relationship between the use of PPE and systolic blood pressure in spraying farmers. [9] Use of personal protective equipment that does not qualify causing pesticide poisoning to the workforce. [(10)]

This study found that the mixing method of pesticides from jasmine sprayers in Kaliprau Village that qualifies was 60 (59.9%). The results were obtained statistically with the Chi-Square Test, that there is no significant difference in the mixing method in the incidence of hypertension (p = 0.448), meaning that the appropriate mixing method does not have a chance of developing hypertension. Based on the results of the study, it was found that the way to store pesticides qualify was 61 (69.6%).

The results were obtained statistically by Chi-Square Test that there was no significant difference in the direction of the wind with the incidence of hypertension (p = 0.648). According to the rules of the use of pesticides, stored pesticides are recommended to be stored in a closed room and protected from sunlight to reduce the factor of evaporation due to chemical reactions.

Conclusions

Sprayers of jasmine farmer in the village of Kaliprau have a mean value of 45 years with the youngest age was 23 years and the oldest age was 65 years. There is no correlation between the frequency of pesticide spraying with the incidence of hypertension in sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang Regency (p-value = 0.574). There is no correlation between the time of spraying pesticides with the incidence of hypertension in sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang Regency (p-value = 0.739). There is no correlation between the duration of work of spraying pesticides with the incidence of hypertension in sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang District (p-value = 0.721). There is a correlation between the working period of spraying pesticides with the incidence of hypertension in sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang Regency (p-value = 0,000). There is no correlation between wind direction and the incidence of hypertension in sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang

Regency (- value = 0.171). There is no correlation between the dose of pesticides with the incidence of hypertension in sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang Regency (p-value = 0.145). There is no correlation between the method of mixing pesticides with the incidence of hypertension in sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang Regency (p-value = 0.448). There is no correlation between how to store PPE pesticides with the incidence of hypertension sprayers of jasmine farmer in Kaliprau Village, Ulujami District, Pemalang Regency (p-value = 0.648).

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