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Analysis of Risk Factors of Pesticides Exposure to Hypertension Events in Women Groups in South Metro District, Lampung Province

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Abstract: ***The use of pesticides become one of the solution in eradicating pests and improving the quality of the crops. The use of pesticides that are quite high in the agricultural area can cause poisoning which will disrupt the function of the sympathetic nervous system in regulating the blood pressure. Based on the preliminary survey by measuring blood pressure on 10 female farmers, it was found that 6 out of 10 people (60%) female farmers had hypertension with systolic pressure ranging from 120-173 mmHg with an average of 152 mmHg and diastolic pressure ranging between 74-95 mmHg with an average of 90 mmHg in 10 farmers. This type of research is observational analytic with a cross sectional study. The sample of this study were 65 samples. The data collection is by conducting an interviews, observation, blood pressure checks and BMI measurements (body mass index). The data analysis is using Chi-square test. Based on the results of bivariate analysis, it is known that the variable use of pesticide dose on systolic blood pressure [RP=1,688 (95%CI; 1,096-2,601) and on diastolic blood pressure [RP=1,703 (95%CI; 1,230-2,357), the variable Working period on systolic blood pressure [RP=3,924 (95%CI; 1,626-9,567) and at diastolic blood pressure [RP=1,735 (95%CI; 1,122-2,682) Based on this study, female farmers who carry out activities related to pesticides should use PPE in full.***

Keywords: Pesticides, Female Farmers, Hypertension

I. INTRODUCTION

Agriculture is one of the most important sectors in fulfilling people's needs. Most of the products from agriculture are used as main food for the people in Indonesia.[1] In Indonesia, most regions rely on agriculture as a source of their regional income, including the horticultural sub-sector, which can be developed to meet food and nutrition needs of the community.[2] In agriculture, problems are often found that can be detrimental to the farmer economically, such as crop failure due to attack by plant pest organisms, so that the use of pesticides is one of the solutions used by farmers.[3] So far, the use of pesticides by farmers are not based on the existing or not pests on the plants, but these dangerous poisons continue to be sprayed on plants.[4] The contamination of the use of pesticides can cause acute and chronic poisoning of pesticides such as dizziness, skin irritation, nausea, increased pulse and disorders of the nervous system.[3] Pesticides have toxic effects on the nervous system by inhibiting the Acetilcolinesterase (AChE) enzyme so that there is an accumulation of Acetylcholine (ACh) which can cause interference with the function of the sympathetic nervous system in regulating blood pressure.[5] Systolic blood pressure in normal conditions ranges from 110-140 mmHg while the diastolic blood pressure is between 70 -90 mmHg. If the systolic pressure exceeds the normal value, it is considered as high blood pressure.[6] WHO states that 22% of adults (aged over or equal to 18 years) experience hypertension. The Centers for Disease Control and Prevention (CDC) said that the main cause of death of Americans in 2013 was high blood pressure, which amounted to ≥ 360,000 people, in the United States as many as 1-3 adults experienced pre-hypertensive blood pressure and as many as 70 million adults 29 % have high blood pressure. [7,8] Based on data obtained from the Metro City, Department of Healthygttui8t is known that the highest disease in 2016 is hypertension. Blood pressure measurement results that is carried out by health workers in health centers from 5 sub-districts located in Metro City in residents aged ≥ 18 years, there are 12,985 people or 21% of the population of Metro City have hypertension. Data from the Sumbersari Bantul Health Center located in Metro Selatan District in 2016 showed that of 113 people with hypertension, there were 12 (10%) men who had hypertension cases and 101 (90%) women who had hypertension.

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Based on the preliminary survey by measuring blood on 10 female farmers, it was found that 6 out of 10 people (60%) female farmers had hypertension with farmers' systolic pressure ranging from 120-173 mmHg with an average of 152 mmHg and diastolic pressure ranging from 74-95 mmHg with an average of 90 mmHg in 10 farmers. The involvement of female farmers in Metro Selatan Sub-district is not only in the process of spraying pesticides but starting from the process of pesticide preparation, mixing and cleaning of spraying equipment so that female farmers are at risk of being affected by exposure of pesticides. It was also found that the average farmer sprayed > 5 years and also used irregular or non-pesticide doses according to the label on the packaging. So on that basis, the author wishes to conduct research on the risk factors for pesticide exposure to the incidence of hypertension in female farmer groups in the South Metro District of Lampung Province.

II. METHODS

This study is an observational analytic study, because the study aims to determine the risk factors for pesticide exposure to a disease. The research design used in this study was cross sectional. The population of this study were all female farmers in the Metro Selatan Sub-District of Lampung Province, with 213 farmers in total. The subjects of the study were 65 female farmers who were taken using the Lameshow formula with inclusion criteria who are willing to be the subject of the study and willing to take blood pressure measurements. The age of the study subjects was at least 18-40 years. Profession as a woman spraying farmer (farm laborer and owner) and exclusion criteria, for example, family has a history of hypertension and previously worked in industries or places that can trigger hypertension such as areas with high noise levels. The Sampling collection uses a purposive sampling. The instrument used in this study was a questionnaire that was used to obtain data on the working period of pesticide doses. Female farmers' blood pressure data are obtained from direct measurements on farmers. Analysis of research data was carried out by univariate and bivariate. In this study the resulting data are grouped so as to produce categorical data. In the biavariate analysis, data were analyzed using the Chi-square test with a confidence level of 95% and a value of $\alpha = 0.05$.

III. RESULTS

Based on the result of hypertension events, it is known that respondents who use pesticide doses that do not match the label on the packaging are 37 (56.9%) and respondents who use pesticide doses according to the label on the packaging are 28 (43.1%). Respondents who worked for spraying> 5 years were 46 (70.8%) and respondents who worked for spraying ≤ 5 years were 19 (29.2%). %). The results of systolic blood pressure examination showed that respondents who had hypertension were 42 (64.6%) and respondents who were not hypertensive were 23 (35.4%). While the results of diastolic blood pressure examination showed that respondents who had hypertension were 52 (80.0%) and respondents who were not hypertensive were 13 (20.0%). The study was conducted on 65 female farmers who were aged 18-40 years. The univariate analysis can be seen in.

Table 1. Univariate analysis

No	Variabel	n (65)	Percentage (%)
1	Dosage of Pesticides		
	- Not suitable with the packaging	37	56,9
	- Suitable with the packaging	28	43,1
2	Annual Work Period		
	- > 5 years	46	70,8
	- ≤ 5 years	19	29,2
3	Systolic Blood Pressure		
	- Hypertension	42	64,6
	- Non Hypertension	23	35,4
4	Diastolic Blood Pressure		
	- Hypertension	52	80,0
	- Non Hypertension	13	20,0

Based on the result of statistical tests using chi square showed that there was a correlation between pesticide doses and the incidence of hypertension in systolic blood pressure with a *p-value* = 0.016, [RP = 1.688 (95% CI; 1.096-2,601). The PR value shows a

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number of 1.688 which means that respondents who use pesticide does not according to the label on the packaging are at risk of 1.688 times experiencing hypertension compared to respondents who use pesticide doses according to the label on the packaging. . The results of statistical tests using chi square showed that there was a correlation between pesticides doses and the incidence of hypertension in diastolic blood pressure with a *p-value* = 0,000, [RP = 1,703 (95% CI; 1,230-2,357). The RP value shows the number 1.703, which means that respondents who use pesticide doses that is not according to the label on the packaging have a risk of 1.703 times having hypertension compared to respondents who use pesticide doses according to the label on the packaging.

Table 2. Correlation of Pesticide Doses to Hypertensive Events

Variable	Systolic Blood Pressure (mmHg)			Diastolic Blood Pressure (mmHg)		
	p	RP	CI 95%	p	RP	CI 95%
Dosage of Pesticides	0,016	1,688	(1,096-2,601)	0.000	1,703	(1,230-2,357)

Based on the result of statistical tests using chi square showed that there was a correlation between years of service with the incidence of hypertension in systolic blood pressure with *p-value* = 0,000, [Rp = 3,924 (95% CI; 1,626-9,567). This can be interpreted that respondents who have worked > 5 years are 3,924 more at risk of hypertension than respondents who have worked ≤ 5 years. The results of statistical tests using chi square showed that there was a correlation between years of service with the incidence of hypertension in diastolic blood pressure with a *p-value* = 0.001, [Rp = 1,735 (95% CI; 1,122-2,682). This can be interpreted that respondents who have worked > 5 years are more at 1,735 times having hypertension than respondents who have worked ≤ 5 years.

Table 3. Correlation of Annual Work Period to Hypertension Events

Variable	Systolic Blood Pressure (mmHg)			Diastolic Blood Pressure (mmHg)		
	p	RP	CI 95%	p	RP	CI 95%
Annual Work Period	0,000	3,924	(1,626-9,567)	0.001	1,735	(1,122-2,682)

IV. DISCUSSION

This research is not in line with almost the same research, conducted by Ma'arif (2016), who stated that there was no significant correlation between pesticide doses and the low cholinesterase levels which triggered hypertension with a *p-value* = 0.471 (PR = 0.722 95 % CI = 0.355-1,467).[9]

The most risk activity is mixing pesticides because when mixing pesticides, concentrates of pesticides are mixed in high levels. Every pesticide has a toxic effect when it enters the human body, it has a mechanism to inhibit cholinesterase enzymes and stimulate the nervous system which triggers hypertension.[5]

Using pesticides according to the dosage is influenced by user awareness, although at the time of the survey there were still many farmers who still mixed pesticides in accordance with the dosage on the packaging, so that pests or diseases that attacked plants were quickly killed, if using pesticides that is according to the packaging label, pests will not die. When mixing pesticides, respondents did not use PPE such as gloves and long-sleeved clothes so that the respondents risked being exposed to pesticides directly. Respondents who became farmers who had been passed down from family, even spraying pesticides or helping families since they were young.

The respondents who have worked as farmers who entered the group ≤ 5 years were new respondents who became farmers because they previously worked as laborers or entrepreneurs.

The longer working as a farmer, the longer the exposure of pesticides that accumulate in the body, so that the impact on health will slowly be felt by farmers. This research is in line with the theory that, the longer farmers work as sprayers, the greater the risk of farmers being exposed to pesticides that have an impact on health.[10] In line with the research conducted by Louisa (1,688), respondents with a working period > 10 years younger had hypertension with a *p-value* = 0.017, meaning that there was a significant correlation between the working period and the incidence of hypertension.[11]

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V. CONCLUSION

A. Systolic blood pressure of respondents with hypertension were 42 people (64.6%) while respondents who did not have hypertension were 23 people (35.4%). Diastolic blood pressure of respondents who had hypertension was 52 (80.0%) while respondents who did not have hypertension were 13 (20.0%).

B. Pesticide dosage is a risk factor for the incidence of hypertension, in systolic blood pressure *p-value* = 0.016, [RP = 1.688 (95% CI; 1.096-2,601) and Diastolic blood pressure a *p-value* = 0,000, [RP = 1,703 (95% CI; 1,230-2,357)

C. Working period is a risk factor for the incidence of hypertension, in systolic blood pressure *p-value* = 0,000, [Rp = 3,924 (95% CI; 1,626-9,567) and at diastolic blood pressure a *p-value* = 0.001, [Rp = 1,735 (95% CI; 1,122-2,682).

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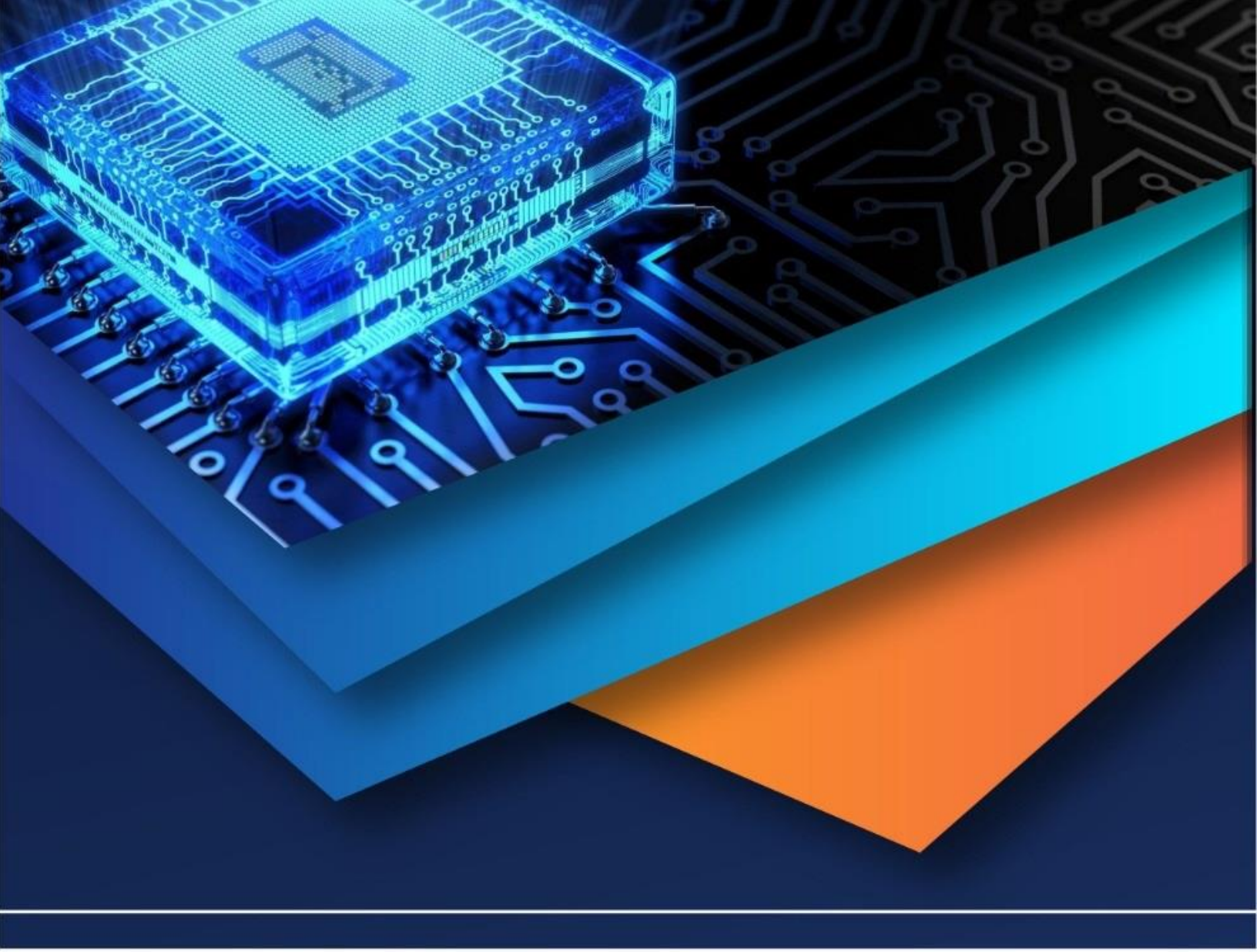

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