



**Risk Of Exposure Of Pesticides On The Hipertens Of Women Farmers In Shallot
Agriculture Banjaratma Village Bulakamba
Brebes District**

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ABSTRACT

The used of pesticides in the village of Banjaratma is quite high. Pesticides are used so that agricultural products are free from pests and can improved the quality of crop yields. The used of pesticides which is quite high can caused problems in humans and the environment. Exposure to pesticides in humans can cause poisoning that disrupts the sympathetic nervous system in regulating blood pressure. Female farmers experienced 70% hypertension. The purpose of this study was aims to determine risk factor for hypertension in female

farmers in the village of Banjaratma, Bulakamba District, Brebes Regency. This research method is an observational study with a cross sectional approach. The sample in this study were 46 female farmers. Data collection through interviews, observation, and blood pressure checks. Data analysis using Chi-square test. The results of univariate analysis found 26 (56.5%) respondents who had hypertension, working period 6 hours 37 (80.4%), length of work ≥ 10 years 35 (76.1%), types of pesticides ≥ 2 types of pesticides 37 (80.4%), frequency of spraying kali 2 times a week 31 (67.4%), pesticide doses that are not in accordance with the recommendations 36 (78.3%), incomplete PPE use 35 (76.1%), and personal hygiene bad 20 (43.5%). The results of bivariate analysis are work period ($p = 0.038$), length of work ($p = 0.029$), frequency of spraying ($p = 0.012$), use of PPE ($p = 0.005$) and hypertension in the family (genetic) ($p = 0.031$). From this study it can be concluded, the risk of hypertension incidence is 9 times greater in female farmers with incomplete PPE usage. To prevent further hypertension, it is recommended to use personal protective equipment in full when carrying out agricultural activities.

Keywords : pesticides, female farmer, hypertension

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Introduction

The level of use of pesticides in Bulakamba District, Brebes Regency is quite high because of the large agricultural land. The highest productivity is shallots, which is 84 quintals or hectares in a single harvest. Farmers' efforts to improve the quality of agricultural products often use pesticides as a solution to reduce losses due to plant pests. This causes farmers and pesticides to be difficult to separate. The most widely used pesticides in Bulakamba District, Brebes Regency are insecticide, fungicide and fertilizing pesticides, with trademarks (Enclor 328 SC which contain imidacloprid 300 g / l active ingredient), (Dagger 200 SL containing imidacloprid 200 g / l active ingredient) and (Movento Energy 240 SC containing the active ingredient imidacloprid 120 g / l).

The use of pesticides can indeed benefit the farmer's economy, but when viewed in terms of health and the environment, pesticides can pollute the environment and cause acute disruption to farmers' health (Bagus, 2013). Every day thousands of farmers and workers on agriculture are poisoned by pesticides and every year it is estimated that tens of thousands of people are involved in poisoning agriculture due to the use of pesticides. The risk of being exposed to pesticides on agriculture also concerns women involved in agricultural activities (Tampudu, 2010).

Data released by FAO (Food Agriculture Organization) the number of women involved in the agricultural sector has increased from year to year. About 65% to 70% of the workforce in horticultural agriculture is female. Women who work in agricultural areas often experience direct or indirect exposure to pesticides during spraying, starting from planting land preparation, planting, harvesting, crop processing, to cleaning pesticide spraying equipment, causing women a greater risk of experiencing the chronic effects of pesticides due to accumulation due to women's activities that are very much in agriculture (Entianopa, 2016).

As for several diseases that can attack women caused by exposure to pesticides such as the development of breast cancer, infertility, and obesity which are risk factors for hypertension. A person suffering from hypertension can run the risk of morbidity and even death. Hypertension



generally does not cause symptoms, so to know it must be done by measuring blood pressure (Caterbow, 2016) (Khan, 2013), (Palmer, 2011).

Hypertension is a disease that is increasingly being found in the Bulakamba District of Brebes Regency, including in Banjaratma Village. From the data obtained by the Siwuluh Health Center located in Bulakamba District, Brebes Regency in 2018, showed that of 423 people with hypertension, there were 112 (10%) men who had hypertension and 311 (90%) women who suffered from hypertension in Banjaratma Village, Bulakamba District, Brebes Regency (Brebes Regency Health Profile, 2017-2018).

This research was conducted on female subjects because women are the population most vulnerable to the incidence of hypertension. Preliminary studies by measuring blood pressure using a sphygmomanometer (*tensiometer*) of 10 female farmers, found that 7 out of 10 people (70%) female farmers had hypertension with systolic pressure of farmers ranging from 120-177 mmHg with an average of 155 mmHg and diastolic pressure ranged from 77-98 mmHg with an average of 90 mmHg in 10 farmers.

Hypertension is a disease that is increasingly found in the Bulakamba District, Brebes Regency, including many in Banjaratma Village. Seeing the increase in the incidence of hypertension which is thought to be triggered by pesticide exposure and considering the importance of health and the role of women farmers, it is necessary to do a description and analysis of the practice of involvement in agricultural activities and risk factors for women farmers in Banjaratma Village, Bulakamba District, Brebes Regency. To provide an overview of the relationship of the use of pesticides with the incidence of hypertension in female farmers, a study was conducted on the use of pesticides with the incidence of hypertension in shallot female farmers in Banjaratma Village, Bulakamba District, Brebes Regency.

Research Methodology

This research is a quantitative study using an observational analytic method with a cross-sectional approach. The population of this research is 90 shallots of onion female farmers of Banjaratma Village, Bulakamba District. The method of taking samples in the study used



purposive sampling techniques and the number of samples taken using the Lane show formula as many as 46 people with inclusion criteria:

1. Willing to be the subject of research and willing to do blood pressure measurements
2. Female sex
3. Peasant female farmers
4. Minimum age of respondent is 30 years
5. Willing to participate in research by filling in informer concerns

The independent variables in this study include length of service, length of work, type of pesticide, dose of pesticide, frequency of spraying, use of personal protective equipment (PPE), and personal hygiene. Secondary data collection was obtained from community health center Siwuluh, Bulakamba District, Brebes Regency, while primary data was obtained by measuring the blood pressure of female farmers, and direct observation of female farmers. Analysis of the data used is Univariate analysis to see an overview of each variable, and Bivariate analysis to see the relationship of independent and dependent variables using the Chi-Square (X²) test with a value of $\alpha = 0.05$. The interpretation of the analysis is that if a $p < \alpha$ value is concluded there is a significant relationship between variables, but if the value of $p > \alpha$ is concluded there is no significant relationship between variables (95% confidence level).

Results And Discussion

Respondents in this study were 46 shallot female farmers in Banjaratma Village, Bulakamba District, Brebes Regency. The results of the study can be seen in the following table:

Variable	Min	Max	Mean	SD
Years of service	8	35	17,98	6,672
Length of working	4	8	6,00	0,998
Type of Pesticide	1	4	2,50	1,006
Spraying Frequency	1	3	1,96	0,788
Age	30	56	40,76	7,355



Table 1 shows that the respondent's tenure as a farmer has an average of 17.98 years which means it is included in the old category because it is more than the same as 10 years. The working period of a farmer is related to the amount of pesticide accumulation that enters the body of a farmer, the longer he becomes a farmer, the higher the risk of poisoning due to pesticide exposure (Ipmawati and Yusniar, 2016). The average respondent's time on agriculture is 6.00 hours per day which means it is in the old category because it is more than the same as 6 hours per day. The duration of exposure of farmers in working every day, including the length of work at risk because of the recommended length of work of farmers, WHO does not exceed 5 hours a day. The types of pesticides used by respondents have an average of 2.50 types of pesticides, which means that the categories of use are more than the same as 2 types of pesticides. This type of pesticide has a close relationship with the physiological effects caused to the body of the farmer. The frequency of spraying the respondent has an average of 1.96, which means entering the frequency of spraying is more than equal to 2 times in one week. The more often farmers spray using pesticides, the more risky they are to experience poisoning from pesticides. The age of respondents as farmers has an average of 40.76 with the youngest age of 30 years and the oldest age of 56 years. The more you age, the higher the exposure you experience. The higher the age of a person, the lower the metabolism in the body so that it is easy to be exposed to pesticides.

Table 2. Descriptive Respondents' Blood Pressure Tables

Variable	Min-Max	Median	Mean	SD
Systolic	110-185	145,00	145,00	17,480
Diastolic	70-110	90,00	90,43	8,745

Table 2 shows that the average systolic blood pressure of the respondents was 145.00 mmHg, with the lowest systolic pressure of 110 mmHg and the highest systolic blood pressure of 185 mmHg. While the average diastolic blood pressure of respondents was 90.43 mmHg, with the lowest diastolic pressure of 70 mmHg and the highest diastolic pressure of 110 mmHg. From



the descriptive table of blood pressure it is known that, these results can be said to have a high incidence of hypertension due to systolic and diastolic blood pressure exceeding 140/90 mmHg.

Hypertension is an increase in systolic blood pressure exceeding 140 mmHg and an increase in diastolic 90 mmHg. This is because this increased cardiac output together with peripheral pressure will affect an increase in blood pressure. Someone is declared hypertensive if within two measurements within an interval of 5 minutes shows a number above the normal limit (Bell, 2015). 9 Systolic blood pressure is blood pressure which is produced by the heart muscle when pushing blood from the left ventricle to the aorta. Diastolic blood pressure is blood pressure in the walls of arteries and blood vessels due to loosening of the heart ventricular muscles (Smeltzer, 2001).

The incidence of hypertension can be influenced by various factors. One of the factors that can be changed is hypertension, high intake of sodium (salt). While hypertension factors that cannot be changed such as age, history of the disease, and hypertension in the family (genetic). Hypertension can be prevented if controlled. Therefore, to prevent hypertension, respondents need to adopt a healthy lifestyle one of which is to reduce foods high in alcohol (salt) in their daily lives.

Risk Factors Analysis of Pesticide Exposure with Hypertension

Table 3. Relationship between risk factors and hypertension events

Risk Factors	For Occurrence of Hypertension						<i>p</i> <i>value</i>	OR (95% CI)
	Hypertension		Not Hypertension		Total			
	f	%	f	%	f	%		
Years of service								
≥10 years	24	64,9	13	35,1	37	100	0,029	6,462 (1,168-35,736)
<10 years	2	22,2	7	77,8	9	100		
Length of working	23	65,7	12	34,3	35	100	0,038	5,033



	3	27,3	8	72,7	11	100		(1,141-22,890)
≥6 hours per day								
<6 hours per day	22	59,5	15	40,5	37	100	0,472	1,833
	4	44,4	5	55,6	9	100		(0,422-7,969)
Type of Pesticide	22	61,6	14	38,9	36	100	0,292	2,357
≥2 Types of pesticides	4	44,0	6	60,0	10	100		(0,563-9,866)
<2 types of pesticides	22	71,0	9	29,0	31	100	0,012	6,722
	4	26,7	11	73,3	15	100		(1,687-26,784)
Pesticide Dosage								
It is not in accordance with Corresponding	24	68,6	11	31,4	35	100	0,005	9,818
	2	18,2	9	81,8	11	100		(1,811-53,221)
	14	50,0	14	50,0	28	100	0,907	1,286
	12	66,7	6	33,3	18	100		(0,395-4,188)

Relationship of Work Period with Hypertension

The results of the analysis showed that, of 37 respondents who had a service life of ≥ 10 years there were 24 respondents (64.9%) who had hypertension, whereas of 9 respondents who had a working period of < 10 years there were 2 respondents (22.2%) who had hypertension. Statistical test results prove that there is a significant relationship between work period and the incidence of hypertension of female farmers in Banjaratma Village, Bulakamba District, Brebes Regency (p value = 0.029; OR = 6.462; 95% CI = 1.168-35.736) which means that female farmers who work 10 years have the risk is 6 times greater than that of female farmers who have a tenure of < 10 years.

These results indicate, the longer a person becomes a farmer, the more likely there is contact with pesticides and the longer a person works in an agricultural area, the greater the amount of pesticides in his body which will ultimately cause adverse effects on health (Isnawan,



2013). From the results of interviews and observations in the field, the majority of women farmers have worked for more than 10 years. This figure can be interpreted that agriculture is a permanent job of women farmers in the village of Banjaratma and most likely will continue as long as they are still able to run it. During those 10 years, female farmers also used pesticides as an effort to eradicate pests in shallots plants. The working period is more than equal to 10 years for female farmers, causing more and more exposure to pesticides that enter the body.

In line with Zulfania's research in 2018, which was conducted on spraying farmers in Sumberejo Village, Ngablak District, Magelang District as many as 43 farmers, it was found that there was an increase in systolic blood pressure in farmers with a working period > 5 years (p value = 0.017) and there was an increase in diastolic blood pressure in farmers with a working period of <5 years (p value = 0.015) where researchers state that exposure to pesticides does not always directly have a significant impact on the human body and chronic poisoning in the long term can cause health problems (Zulfania, Setiani and Dangiran, 2017).

The longer the farmers carry out spraying activities and occur continuously, the higher the risk of poisoning and rising blood pressure. Therefore, to reduce the risk that might be caused by pesticide exposure, it is better for female farmers who have more than 10 years of work time and need adequate rest and not be too long in the agricultural environment when they have finished working. The seller can arrange a work shift schedule for female farmers over the age of 30 years with a work period of more than 10 years, thereby reducing the risk factors for hypertension in female farmers, because the longer the work period the more age increases and the age increases the pressure blood will increase and hypertension is most dominant in the age group of 31 years to 55 years.

Relationship Duration of Work with Hypertension

The analysis showed that, of the 35 respondents who had worked ≥ 6 hours per day there were 23 respondents (65.7%) who had hypertension, while of the 11 respondents who had worked <6 hours per day there were 3 respondents (27.3 %) who have hypertension. Statistical test results prove that there is a significant relationship between the length of work and the



incidence of hypertension in female farmers in Banjaratma Village, Bulakamba District, Brebes Regency (p value = 0.038; OR = 5,033; 95% CI = 1,141-22,890) which means female farmers who work ≥ 6 hours per day has a risk 5 times greater than female farmers who work < 6 hours per day.

These results indicate, the length of time that farmers work using pesticides has the possibility of greater exposure to pesticides. The longer exposure to pesticides, the accumulation or accumulation of pesticides in the body, which will disrupt the work of the enzyme cholinesterase, triggering high blood pressure (Boxall, 1966). From the results of interviews and observations in the field, in general the working hours of women farmers in the village of Banjaratma, starting from 06.00 am to 16.00 pm, this requires women farmers to be exposed to pesticides for more than 6 hours every day. Meanwhile, according to the World Health Organization (WHO) requires a long time working in a workplace that is at risk of pesticide poisoning, which is 5 hours per day or 30 hours per week. The longer the work time of a farmer, the risk of being exposed to pesticides is also higher, this is inversely proportional to the length of work of female farmers in the village of Banjaratma, which has an average work of more than equal to 6 hours per day, with the recommended length of work from the World Health Organization (WHO), wherein working in a workplace that is at risk of pesticide poisoning is a maximum of 5 hours per day.

This study is in line with Nasri's (2010) research which states that there is a significant relationship between work duration and the incidence of hypertension (p value = 0.001). Nasri's research results show that work duration affects the incidence of hypertension which can be influenced by environmental factors at work, such as exposure to heat, dust, or smoke (Nasir and Moazen-zadeh, 2006).

In general, farmers consider that exposure to pesticides is not harmful, and the length of work in agriculture is considered normal, but in fact the length of work affects the amount of pesticides that are absorbed and accumulated in the body. Therefore, to reduce the risk that might be caused by exposure to pesticides, it is recommended that female farmers who have more than



6 hours of work per day be expected to arrange a schedule for rest, at least 1 hour before returning to farming, especially for female farmers have a history of hypertension, this is because excess activity can affect the stability of a person's blood pressure, because the harder and more frequent the heart muscle pumps, the greater the pressure imposed on the arteries, and this can trigger blood pressure to rise.

The Relationship between Pesticides and Hypertension

The analysis showed that, of the 37 respondents who used ≥ 2 types of pesticides there were 22 respondents (59.5%) who had hypertension, while of 9 respondents who used < 2 types of pesticides there were 4 respondents (44.4%) who had hypertension. Statistical test results obtained (p value = 0.472) $> (0.05)$, which means there is no relationship between the type of pesticides with the incidence of hypertension in female farmers in Banjaratma Village, Bulakamba District, Brebes Regency.

These results indicate that, each type of pesticide has different physiological effects from the content of the active substance and the physical properties of the pesticide itself (Mualim, 2015). From the results of interviews and observations in the field, the type of pesticides used in the village of Banjaratma are types of pesticides consisting of insecticides, fungicides, and fertilizers. The lack of connection in this study could be due to the most widely used pesticide group, the neonicotinoid group with trademarks (Enclor 328 SC which contains the active ingredient imidacloprid 300 g / l), (Dagger 200 SL containing the active ingredient imidacloprid 200 g / l), (Movento Energy 240 SC which contains an active ingredient imidacloprid 120 g / l), and (Viligon 10 WP containing an active ingredient imidacloprid 10%) where the group is a group with low toxicity to humans, this is in accordance with data from the Ministry of Agriculture (2016) that the type of pesticide used by the respondent is a type of pesticide that has an active ingredient that is safe to use and is a type of pesticide that is permitted. Another factor that might have caused no connection was that female farmers in Banjaratma Village would mix the types of pesticides used for spraying activities, when they had received approval from male



farmers (husbands) due to minimizing the ineffectiveness of pesticides for limiting plant pests on shallots.

These results are in line with research conducted by Arif in 2016 which stated there was no relationship between the type of pesticides and poisoning in vegetable spraying farmers in Mendongan Village, Sumowono District, Semarang Regency. Because the data taken does not have significant variation so that the value of each respondent is almost the same (p value = 0.123) (Arif, Suhartono and Dewanti, 2016).

The use of this type of pesticide by female farmers is relatively low in toxicity to humans, but the facts are that there are still female farmers in the field who use organophosphate and carbamate pesticides, where the organophosphate pesticide group is the most toxic group of pesticides that has a way of inhibiting the enzyme cholinesterase, and can be resulting in disruption of the sympathetic nervous system and organophosphate users are female farmers who want to get results with good quality and quickly in eradicating plant pests on shallots, as well as for carbamate pesticides which have the function of inhibiting the enzyme cholinesterase. Therefore, although most farmers use pesticides with low toxicity, it is necessary to be on the lookout for types of pesticides with high toxicity that can adversely affect health, because there are still farmers who use these pesticides.

The Relationship of Pesticide Dose with the Occurrence of Hypertension

The results of the analysis showed that, of the 36 respondents who used pesticides that did not match the dosage on the packaging label, there were 22 respondents (61.6%) who had hypertension, while of the 10 respondents who used the pesticide according to the dosage on the packaging label there were 4 respondents (40.0%) who have hypertension. Statistical test results obtained (p value = 0.292) > (0.05) which means there is no relationship between the dose of pesticides with the incidence of hypertension in female farmers in Banjaratma Village, Bulakamba District, Brebes Regency.



Dose is the amount of toxic active ingredient that aims to control disruptive organisms. The dosage and concentration must be in accordance with the measurements on the packaging label. Increasing the dosage can harm farmers and the environment. While reducing the dose causes pesticides to be less effective when applied (Wudianto, 2008).

In line with Louisa's research in 2018 about the relationship between the use of pesticides and the incidence of hypertension among farmers in Gringsing Village, Gringsing District, Batang Regency, the results of this study showed a percentage of (65.9%) farmers in Gringsing District had used pesticides according to the recommendations or labels on the packaging. After analyzing the data it was concluded that there was no relationship between the dose of pesticides with the incidence of hypertension (p value = 0.664) (Louisa and Joko, 2018).

The use of pesticides that are in accordance with the dosage or not according to the dosage on the packaging label, has no direct effect on the danger due to exposure to the pesticide, but the use of pesticides that exceed the dosage rules can endanger the farmers themselves. Each chemical is basically poisonous and the occurrence of poisoning is determined by the dosage and method of administration. From the results of interviews and observations in the field, the dosage of pesticides on female farmers in the village of Banjaratma is included in the category of using pesticide doses that are not appropriate on the packaging label. The lack of connection in this study can be caused, female farmers who use spraying machines for spraying onion activities, there is no direct contact with pesticides during the mixing process, because pesticides are mixed into the spraying machine vats, directly stirred by the machine, this method quite safe because women farmers just pour it without having to stir the pesticide. Another factor that might have caused no relationship was that there were still 10 (21.7%) female farmers who used pesticides according to the dosage on the packaging label, because the female farmer had followed the socialization activities given by the Bulakamba District in Brebes Regency regarding the dosage and danger excessive use of pesticides on health. Although there are still female farmers who use pesticides according to the dosage on the packaging label, but it is inversely proportional to the number of female farmers who use pesticides that do not match the dosage on the packaging



label, because female farmers want to get quick results in eradicating pests and plant growth so that compounding not in accordance with the recommendations on the packaging label. Therefore, the use of pesticides in farmers who do not match the dose, pesticide exposure can be minimized with the help of a spraying machine during the mixing process of pesticides.

Relationship of Frequency Spraying with Hypertension

The analysis showed that, of the 31 respondents who carried out spraying activities kali2 times a week there were 22 respondents (71.0%) who experienced hypertension, while of the 15 respondents who carried out spraying activities <2 times a week there were 4 respondents (26 , 7%) who have hypertension. Statistical test results prove there is a significant relationship between the frequency of spraying with the incidence of hypertension in female farmers in Banjaratma Village, Bulakamba District, Brebes District (p value = 0.012; OR = 6.722; 95% CI = 1.687-26.784) which means that female farmers who spray ≥ 2 once a week has a risk of 7 times greater than female farmers who do spraying activities <2 times a week.

These results indicate, the more often farmers do spraying activities using pesticides, the risk of exposure to pesticides will be higher, which can interfere with acetylcholinesterase activity so that it results in high blood pressure (Wudianto, 2008). From the results of interviews and observations in the field, the most frequent frequency of spraying was done by women farmers in Banjaratma Village to spray shallots twice a week. Spraying is carried out according to the schedule determined by the onion stalls, not seeing the presence or absence of pests on the onion plants. Other factors that might cause a relationship, namely incomplete female farmers in using personal protective equipment (PPE) when spraying, where female farmers are limited to using head coverings, long sleeves, and long-sleeved pants, this may trigger exposure to pesticides quickly enters the body through inhalation because female farmers do not use masks when spraying.

This study is in line with Suparti (2016) about risk factors that influence the incidence of pesticide poisoning in farmers, which states that the habit of spraying with a frequency of more



than 2 times a week has a risk of 4,727 and 2.3 times compared to a frequency of less than 2 times a week (Suparti, 2016).

Pesticide exposure to the human body with frequent frequency and with short time intervals can cause pesticide residues in the human body to be higher. Therefore it is better to reduce the risk caused by pesticide exposure to the frequency of spraying, female farmers can carry out spraying activities in accordance with the recommended provisions, which is a maximum of 2 times a week, so that poisoning caused by pesticide exposure can be minimized. Because indirectly the activities of farmers who reduce the frequency of spraying can reduce exposure to the body. And can be supported by the use of complete personal protective equipment (PPE).

The Relationship between the Use of Personal Protective Equipment and Hypertension

The analysis showed that, of the 35 respondents who used personal protective equipment (PPE) incomplete there were 24 respondents (68.6%) who had hypertension, while of the 11 respondents who used personal protective equipment (PPE) there were 2 respondents (18, 2%) who have hypertension. Statistical test results prove that there is a significant relationship between the use of personal protective equipment (PPE) with the incidence of hypertension in female farmers in Banjaratma Village, Bulakamba District, Brebes Regency (p value = 0.005; OR = 9.818; 95% CI = 1,811-53,221) which means female farmers those who work using incomplete personal protective equipment have a 9 times greater risk than women farmers who use self-protection equipment (PPE) when working.

These results indicate, one of the main factors in the exposure of pesticides is the complete use of personal protective equipment (PPE) and someone who works not using personal protective equipment (PPE) when carrying out activities with pesticides can increase exposure that enters the body, causing impacts such as poisoning and long-term health problems (Djojsumarto, 2008). From the results of interviews and observations in the field, obtained from 46 female farmers there were 35 (76.1%) female farmers using incomplete Personal Protective



Equipment, incomplete female farmers in using personal protective equipment (PPE) while working, because female farmers felt uncomfortable if use all the equipment Personal Protective Equipment, and feel disturbed when doing spraying activities. Female farmers only use long-sleeved clothes, long-sleeved pants and headgear, while personal protective equipment such as masks, boots, gloves and goggles are rarely used or even almost never used when working (farming).

This study is in line with research conducted by Novia in 2018 about the analysis of pesticide exposure factors on the incidence of hypertension in farmers farmers farmer groups in South Metro Subdistrict, Lampung Province with the results of the study of 65 respondents there were 45 (69.2%) people incomplete in using tools personal protector. After analyzing the data, it can be concluded that there is a relationship between the use of self-rolling equipment and the incidence of hypertension (p value = 0.036) (Amalia, 2018).

Farmers are at high risk for exposure to pesticides from various entry routes, namely through breathing, mouth, or skin, the use of personal protective equipment (PPE) is very important to use at work, so as to minimize the occurrence of exposure that can enter the body. One way to prevent the occurrence of absorption of pesticides into the body by using personal protective equipment (PPE) in full which serves to protect body parts with portal pesticide entry potential. For this reason, female farmers should use a complete personal protective equipment (PPE) consisting of 7 types: long-sleeved clothes, long pants, masks, headgear (caps), glasses, gloves and boots, it is important to avoid contact directly with pesticides, as well as onion stalls before and after work can remind female farmers, to always use personal protective equipment (PPE) when in direct contact with pesticides and also the stalls can provide reserves of Personal Protective Equipment to be lent if there are female farmers who not complete carrying personal protective equipment.



Relationship of Personal Hygiene with the Occurrence of Hypertension

The results of the analysis showed that, of the 28 respondents who had poor personal hygiene there were 14 respondents (50.0%) who had hypertension, while of the 18 respondents who had good personal hygiene there were 12 respondents (66.7%) who had hypertension. Statistical test results obtained (p value = 0.907) > (0.05) which means there is no relationship between personal hygiene with the incidence of hypertension in female farmers in Banjaratma Village, Bulakamba District, Brebes Regency.

These results indicate that it is very important for workers to be healthy and safe at work. Personal hygiene is a basic concept of cleaning, tidiness and personal care for each individual (Pesticides, Farmers, Marsaulina and Wahyudi, 2012). From the results of interviews and observations in the field, Personal Hygiene applied by female farmers in Banjaratma Village is included in the good category, where of 46 respondents there were 18 (39.1%) respondents with a good personal hygiene category. This can be caused, women farmers know that the work they have done so far is directly related to pesticides which can cause the body to be contaminated. Women farmers also know that pesticides are dangerous and poisonous substances, making women farmers immediately to clean all bodies contaminated with soap, the faster to clean the body due to pesticide contamination, the less pesticides that contaminate the skin. Because personal hygiene of workers can prevent the spread of germs and disease, and reduce exposure to chemicals and contamination.

This study is in line with the research of Budiawan (2013) which explains that there is no relationship between individual hygiene with shallots farmers in Ngurensiti Village, Wedarijaksa District, Pati Regency. Budiawan's research results state that if a farmer is directly related to pesticides, then does not immediately clean them, it will facilitate the emergence of various diseases caused by exposure to pesticides (Budiawan, 2013).

Basically Personal Hygiene is care or personal hygiene that is carried out to maintain health, both before, during and after work. Even though personal hygiene has no relationship with hypertension, women farmers must always pay attention to cleanliness and self-care at the



time before and after work (farming) because it is directly related to pesticides, where the body will automatically be contaminated by these pesticides.

Conclusion

The biggest risk factor for pesticide exposure to hypertension is compliance with personal protective equipment (PPE), where female farmers who use incomplete personal protective equipment (PPE) have a 9.8 times greater risk of experiencing hypertension. And other factors are (frequency of spraying, length of service and length of work).

Women farmers are expected to be able to use complete personal protective equipment consisting of 7 types, namely: long-sleeved clothes, long pants, masks, headgear (caps), glasses, gloves and boots to avoid direct exposure to pesticides

Reference

1. Bagus D. Hubungan Antara Aktivitas Asetilkolinesterase Darah Dengan Tekanan Darah Yang Terpapar Organofosfat Title. J Kesehat Masy. 2013;
2. Tampudu S, Russeng syamsiar S, Rahim MR. Kadar Cholinesterase Darah Petani Penyemprot Pestisida di Desa Minasa Baji Kab. Maros. J MKMI. 2010;6(2):102–7.
3. Entianopa. Faktor Yang Berhubungan Dengan Paparan Pestisida Pada Pekerja Chemis (penyemprotan). J Endur. 2016;
4. Caterbow A, Hausman J W (Woman I for a CF. Woman and Chemicals the Impact of Hazardous Chemicals on Women. United Nat. Nairobi, editor. 2016.
5. Khan DA, Ahad K, Ansari WM KH. Pesticide exposure and endocrine dysfunction in the cotton crop agricultural workers of southern Punjab. Asia Pacific J Public Heal. 2013;25:2.
6. Palmer A WB. Tekanan Darah Tinggi. Jakarta: Gramedia Pustaka Utama; 2011.
7. Profil Kesehatan Kabupaten Brebes 2017. 2018.
8. Ipmawati, PA. Onny, S. Yusniar H. Analisis Faktor-faktor risiko yang mempengaruhi tingkat keracunan pestisida pada petani di Desa Jati, Kecamatan Sawangan, Kabupaten Magelang, Jawa Tengah. J Kesehat Masy. 2016;4(1):432.
9. Bell, KT. Olin J. Hypertension: The Silent Killer: Updated JNC- 8 Guideline Recomdations. Alabama Pharm Assoc; 2015.
10. Smeltzer B. Buku Ajar Keperawatan Medikal Bedah. 8 th. Jakarta: EGC; 2001.
11. Isnawan R. Faktor-faktor yang Berhubungan dengan Kejadian Keracunan Pestisida pada Petani Bawang Merah di Desa Kedunguter Kecamatan Brebes Kabupaten Brebes. J Kesehat Masy Univ Diponegoro. 2013;2(1):18814.



12. Zulfania K, Setiani O, Dangiran H. Hubungan Riwayat Paparan Pestisida Dengan Tekanan Darah Pada Petani Penyemprot Di Desa Sumberejo Kecamatan Ngablak Kabupaten Magelang. *J Kesehat Masy*. 2017;5(3):392–401.
13. Boxall JS. The incidence of poisoning. *Med J Aust*. 1966;2(7):310–4.
14. Nasri H, Moazenzadeh M. Coronary Artery Disease Risk Factors in Drivers Versus People in other Occupations. *ARYA J* [Internet]. 2006;2(2):75–8. Available from: <http://www.arya.mui.ac.ir/index.php/arya/article/view/150>
15. Mualim K. Analisis Faktor Risiko yang Berpengaruh Terhadap Kejadian Keracunan Pestisida Organofosfat pada Petani Penyemprot Hama Tanaman di Kecamatan Bulu, Kabupaten Temanggung, 2002. Vol. 1, *Jurnal Kesehatan Lingkungan Indonesia*. 2015. p. 56–60.
16. arif M, Suhartono S, Dewanti N. Studi Prevalensi Keracunan Pestisida Pada Petani Penyemprot Sayur Di Desa Mendongan Kecamatan Sumowono Kabupaten Semarang. *J Kesehat Masy*. 2016;4(5):35–43.
17. Wudianto R. *Petunjuk Penggunaan Pestisida*. Jakarta: Penebar Swadaya; 2008.
18. Louisa M, Joko T, Lingkungan BK, Masyarakat FK, Diponegoro U. Hubungan Penggunaan Pestisida Dengan Kejadian Hipertensi Pada Petani Padi Di Desa Gringsing Kecamatan Gringsing Kabupaten Batang. *J Kesehat Masy*. 2018;6(1):654–61.
19. Suparti S. Beberapa faktor risiko yang berpengaruh terhadap kejadian keracunan pestisida pada petani. *J Pena Med*. 2016;6(125–138):2.
20. Djojosumarto P. *Pestisida dan Aplikasinya*. Jakarta: Agromedia Pustaka; 2008.
21. Amalia RN. Analisis Faktor Risiko Paparan Pestisida Terhadap Kejadian Hipertensi Pada Kelompok Tani Wanita Di Kecamatan Metro Selatan Provinsi Lampung. 2018;
22. Pestisida K, Petani P, Marsaulina I, Wahyuni AS. Faktor-Faktor Yang Berhubungan Dengan Keracunan Pestisida Pada Petani Hortikultura Di Kecamatan Jorlang Hataran Kabupaten Simalungun Tahun 2005. *Media Heal Res Dev*. 2012;17(1 Mar):18–25.
23. Budiawan A. Faktor Risiko Cholinesterase Rendah Pada Petani Bawang Merah. *KESMAS - J Kesehat Masy*. 2013;8(2):198–206.