



HISTORY OF PESTICIDE TAXATION WITH BALANCE DISTURBANCE EVENTS (Community in Cipelem Village, Bulakamba District, Brebes City)

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Abstract

The food crop, plantation and horticultural sector includes the agricultural sector. Pesticides used to eradicate plant pests in agricultural land are expected to increase agricultural yields. There are several factors that affect the inaccuracy of pesticide use, including the level of

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Key words: *History of pesticide exposure, balance disturbance*

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INTRODUCTION

In Indonesia, many districts rely on agriculture as a source of local revenue. The development of the agricultural sector, an increase in pesticide use also occurred in almost all agriculture in Indonesia, especially in Java. Pesticides used to eradicate plant pests in agricultural land are expected to increase agricultural yields and can make agricultural management costs more efficient and economical. (Runia, 2008)

Using pesticides inappropriately can have various negative impacts on humans and the environment. The effects of pesticide poisoning vary widely, ranging from headaches and nausea to even death. The result is poisoning, both acute, chronic and systemic. Pesticide poisoning that is systemic can attack the nervous system, one of them (balance disorders), liver or liver, stomach, immune system and hormonal balance. (Samosir, Setiani and Nurjazuli, 2017)

The city of Brebes, Central Java is the largest onion center in Southeast Asia and the level of use of pesticides is quite large, the average area of shallot plantations reaches around 30,000 ha per year spread over 9 sub-districts of shallot plant centers. The average production reaches 325,000 tons per year with the assumption that the average productivity of shallots is 110.92 ku / ha. The types of pesticides that are widely used in Indonesia are the carbamate, organochlorine, organophosphate and pyrethroid pesticides. (Pane, Jurnal, Kementan, 2019)

Brebes City is still very intensive in the use of agricultural chemicals and is not in accordance with technology recommendations in terms of quantity, type and method of application. For example, the use of pesticides to control pests of onion caterpillars (*Spodoptera exigua*), armyworms (*Spodoptera litura*) and trips (*Thrips tabaci*) with application doses ranging from 560 to 1 588 liters per ha (over dose category) by spraying regularly every 3 to 4 days. , so that in one growing season spraying 15 to 20 times. Control of Plant Pest Organisms is generally carried out by mixing 3 to 4 types of insecticides in one bucket. The use of chemical pesticides that do not match these doses affects not only land and water, but also shallot farmers, and leaves a residue on shallot bulbs. (Rofik, 2009)



Bulakamba is one of the Sub-districts of Brebes Regency located west of the capital city of Brebes with the following boundaries: north: Java sea, south: Larangan and Ketanggungan Districts, west: Tanjung and Kersana Districts, east: Wanasari District. Bulakamba district consists of 19 villages, including: Bangsri, Banjaratma, Bulakamba, Bulakparen, Bulusari, Cimohong, Cipelem, Dukuhlo, Grinting, Jubang, Karangsari, Kluwut, Luwungragi, Pakijangan, Petunjungan, Puloading, Rancawuluh, Siwuluh and Tegalglaga. The area of agricultural land in Cipelem Village, Bulakamba District, Brebes Regency, namely: 244 hectares of rice fields, 41 hectares of land. The types of agricultural crops in Cipelem Village, Bulakamba District, Brebes City are rice, corn, cassava, sweet potato, peanuts and soybeans. The types of livestock in Cipelem Village, Bulakamba District, Brebes Regency are beef cattle, goats, ducks / ducks, and native / laying chickens. (Suparti , Anies and Setiani, 2016)

Factors that influence pesticide poisoning include: dosage used, frequency of spraying, number of types used, time to spray, working time, and not wearing personal protective equipment, not washing hands properly and properly, wearing clothes repeatedly. This situation is very detrimental to health because it can cause pesticide poisoning in farmers. (Entianopa, 2016)

If the use of pesticides is not balanced with personal protective equipment and maintaining good health, their health will gradually be disturbed. Pesticides poison humans not only when they are applied or used, but also when preparing, mixing or after spraying. Pesticide accidents often occur in humans, especially those experienced by people who carry out the spraying causing dizziness when after spraying, fainting, seizures, watery eyes, vomiting, skin itching, sores, heartburn, and even ending until death. (Dwi, 2019)

The World Health Organization (WHO) and the Environment Program of the Nations (UNEP) estimate that each year 3 million agricultural workers experience pesticide poisoning, and 18,000 of them die. It is likely that 25 million people experience mild symptoms of pesticide poisoning each year. Apart from the effects of disturbances on reproduction, growth and development and poisoning. Pesticides can also upset the body's balance.



Research conducted by Kholilah Samosir, shows that there is a relationship between cholinesterase levels and exposure to pesticides in Sumberejo Village farmers in Ngablak District, Magelang Regency 14.3% experienced pesticide poisoning and 34.3% of farmers experienced balance disorders. The risk factors for poisoning, among others: the farmer's working period, the length of work per day, the method of spraying, the use of personal protective equipment affect the cholinesterase levels in the blood which can cause disturbances in body balance. (Samosir , Setiani and Nurjazuli, 2017)

Based on the results of research conducted by Shaliha Afifah Dhaningtyas, there is a relationship between cholinesterase levels and balance disorders in farming communities in Bandungan City, Semarang City with the results of $RP = 3,865$ and Confidence Interval (CI) 95% = 1,051-14,214. (Purba, 2009)

The mechanism of exposure to pesticides against balance disorders, namely pesticides enter the human body through the digestive tract, respiratory tract or inhalation and through unprotected skin surfaces so that it can affect nerve function by inhibiting the work of the cholinesterase enzyme and the cholinesterase enzyme itself is an enzyme found in cellular fluids which functions to stop the action of acetylcholine (AChE) by hydrolyzing it into choline and acetic acid. Acetylcholine is a neuron that is located between nerve endings and muscles which serves as a medium for transmitting nerve stimulation or impulses to receptors for muscle and glandular cells. If the function of the cholinesterase enzyme cannot work properly, it will cause the function of the central nerve to be disturbed and this will lead to a balance disorder. (Purba, 2009)

MATERIALS AND METHODS

This type of research is observational with a cross sectional design. The sampling technique was nonprobability sampling with purposive sampling. The population in this research is the people of Cipelem Village, Bulakamba District, Brebes City. The sample in this study were the people of Cipelem Village, Bulakamba District, Brebes City who met the criteria, amounting to



62. Data collection used a questionnaire and a history of body balance disorders using the Romberg test.

Data analysis is presented by descriptive analysis of values or numbers including mean, standard deviation, median, minimum and maximum values for each of the variables studied. Inferential analysis was carried out by using the Chi-Square test to determine the relationship or the presence or absence of meaning between the independent and dependent variables. Multivariate analysis was carried out by using logistic regression to see the relationship between the independent variables that had the most influence on the dependent variable.

RESULTS

Based on the research results, it can be seen that the age distribution of respondents has a range of 22-63 years and the average age of the respondents is 39.2 with a standard deviation value of 10.55 and a minimum value of 22 years and a maximum of 55 years. The sex of the community in Cipelem Village, Bulakamba District, Brebes City, who became respondents were male and female, totaling 62 people (84.2%). Respondents had education in Cipelem Village, Bulakamba District, Brebes City. %) While 62 respondents in Cipelem Village, Bulakamba District, Brebes City (100%) have jobs as farmers.

Most of the respondents had a work period of > 20 years, as many as 23 people (37%) and 39 people <20 years (62%). Respondents with spraying work duration per day mostly > 3 hours / day were 19 people (27%) and <3 hours / day 43 (72%). Respondents who had spraying frequency > 2 times per week in Cipelem Village, Bulakamba District, Brebes City were 19 people (30%) and <2 times / week 43 people (69%). Respondents who used mixed types of pesticides in Cipelem Village, Bulakamba District, Brebes City > 3, were 37 people (59%) and <3 mixtures were 25 people (40%). Respondents who used incomplete personal protective equipment were 46 people (74%) and those who used complete personal protective equipment were 16 people (25%). Respondents who used pesticide doses that were not according to recommendations in Cipelem



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Village, Bulakamba District, Brebes City were 15 people (24%) and 47 people (75%) were in accordance with the recommendation.

Examination of the history of body balance disorders is categorized by Romberg test positive and Romberg test negative based on the doctor's diagnosis, where 33 people (53.2%) had a positive Romberg test.

A detailed description of the research variables can be seen in the table:

No	Variable	F	%
1	Last education		
	Primary school	41	66
	Junior high school	16	25
	Senior High School	5	8
2	Years of service		
	>20 years	23	37
	≤20 years	39	62
3	Dosage as recommended		
	No	15	24
	Yes	47	75
4	Spraying time		
	>3 hour / day	19	27
	≤3 hour / day	43	72
5	Number of pesticides		
	> 3 mix	37	59
	≤ 3 mix	25	40
6	Spray frequency		
	>2 times / week	19	30
	≤2 times / week	43	69
7	Personal protective equipment		
	Uncomplate	46	74
	Complate	16	25
8	Balance disorders		



	Yes	33	53
	No	29	47
9	Smoking habit		
	Yes	35	56
	No	27	44
10	Drug consumption habits		
	Yes	37	59
	No	25	40

Statistic analysis

Based on the working period > 20 years, there were more balance disorders (65.2%) compared to respondents with a working period of ≤ 20 years (33.3%). The significance value is 0.049 or $p < 0.05$, so that there is a relationship between working tenure and balance disorders among respondents in Cipelem Village, Bulakamba District, Brebes City. The result of $RP = 1.957$ with a Confidence Interval (CI) of 95% = 1.062 - 3.605 so that the prevalence of balance disorders in respondents with a service period of > 20 years is 2 times greater than those with a service period of ≤ 20 years.

Based on the duration of pesticide spraying > 3 hours / day, there were more balance disorders (70.5%) compared to respondents with pesticide spraying time ≤ 3 hours / day. The significance value is 0.042 or $p < 0.05$, so there is a relationship between the duration of pesticide spraying and the balance disturbance among respondents in Cipelem Village, Bulakamba District, Brebes City. The results of $RP = 1.974$ with a Confidence Interval (CI) of 95% = 1.164–3.348 so that the prevalence of balance disorders in respondents with spraying time > 3 hours / day is 2 times greater than the duration of spraying ≤ 3 hours / day.

Based on the frequency of pesticide spraying ≤ 2 times / week, there were more balance disorders (51.1%) compared to respondents with the frequency of spraying pesticides > 2 times / week. The significance value is 0.741 or $p > 0.05$, so there is no relationship between the frequency of pesticide spraying and balance disturbances among respondents in Cipelem Village, Bulakamba District, Brebes City. $RP = 0.667$ with 95% Confidence Interval (CI) = 0.207 - 2.147.



Based on the type of pesticide > 3 mixtures experienced more balance disorders (59.4%) compared to respondents who used ≤ 3 mixtures of pesticides (28%). The significance value is 0.022 or $p < 0.05$, so that there is a relationship between the number of pesticides and balance disorders among respondents in Cipelem Village, Bulakamba District, Brebes City. The results of $RP = 3$ with a Confidence Interval (CI) of 95% = 1,052 - 8,553 so that the prevalence of balance disorders in respondents who use the type of pesticide > 3 mixtures is 3 times greater than the type of pesticide ≤ 3 mixtures.

Based on the pesticide dosage not according to the recommendation, there were more balance disorders (53.3%) than the respondents who used the recommended pesticide (46.8%). The significance value is 0.839 or $p > 0.05$, so there is no relationship between pesticide dose and balance disturbances in respondents in Cipelem Village, Bulakamba District, Brebes City. The result of $RP = 1.165$ with 95% Confidence Interval (CI) = 0.65 - 2.088.

Recapitulation of Multivariate Inferential Analysis Results

No	Variable	P value	RP	Value 95% CI		information
				Lower	Upper	
1	Years of service	0,049	1,957	1,062	3,605	Significant
2	Length of working	0,042	1,974	1,164	3,348	Significant
3	Frequency of spraying pesticides	0,741	0,667	0,207	2,147	Not significant
4	Number of pesticides	0,022	3	1,052	8,553	Significant
5	Pesticide dosage	0,839	1,165	0,65	2,088	Not significant



Bivariate Analysis

The significant variables are the working period, the duration of spraying and the number of pesticides.

In the table below the results of the logistic regression analysis between pesticide exposure and balance disturbance

Risk factor	Balance disorders				OR(95%CI)	p
	Yes		No			
	N	%	N	%		
1 Years of service						
> 20 years	15	65,2	8	34,8	1,957(1,062 – 3,603)	0,049
<20 years	11	28,2	28	71,7		
2 Old Refinement						
rattan	12	70,5	5	29,4	1,974(1,164 – 3,348)	0,042
> 3 hours / day	17	39,5	26	60,4		
3 ≤3 hours / hi						
Pen frequency	7	36,8	12	63,1	0,667(0,207 – 2,147)	0,741
spray	22	51,1	21	48,8		
4 > 2 times / week						
≤2 times / week	22	59,4	15	40,5	3(1,052 – 8,553)	0,022
Types of pesticides	7	28	18	72		
5 > 3 mixtures						
≤3 mixture	8	53,3	7	46,6	1,165(0,65 – 2,088)	0,839
Pesticide dosage	22	46,8	25	53,1		

Based on the variables related to balance disorders, namely the length of service and duration of spraying. The strength of the relationship between the two variables.



DISCUSSION

A. The Relationship between Working Period and Balance Disorders of the respondent

The results of the multivariate analysis show that the minimum work period is 1 year and the maximum is 35 years. The results of the analysis show a significance value of 0.049 or $p < 0.05$, that there is a relationship between tenure and balance disorders. The result of $RP = 1.957$ with a Confidence Interval (CI) of 95% = 1.062 - 3.605 so that the prevalence of the incidence of balance disorders of farmers with a service period of > 18 years is 2 times greater than that of ≤ 18 years of service.

B. The Old Relationship of Pesticide Spraying with Balance Disorders of the respondents

The duration of pesticide spraying in this study was from 1 to 4.5 hours in 1 day. The majority of respondents sprayed pesticides for 2 hours. The majority of respondents sprayed at 7 am. Only a few respondents sprayed pesticides during the day and evening. The significance value is 0.042 or $p < 0.05$, so there is a relationship between the duration of pesticide spraying and the balance disturbance of the respondents. The results of $RP = 1.974$ with a Confidence Interval (CI) of 95% = 1.164 - 3,348 so that the prevalence of disturbance of farmers' balance with spraying time > 3 hours / day is 2 times greater than the duration of spraying ≤ 3 hours / day.

C. The relationship between frequency of pesticide spraying and balance disturbances in respondents

The results of the analysis show a significance value of 0.741 or $p > 0.05$, so there is no relationship between the frequency of pesticide spraying and balance disturbances in the respondents. $RP = 0.667$ with 95% Confidence Interval (CI) = 0.207 - 2.147.

D. The relationship between the number of types of pesticides and balance disorders in the respondent

The results of the analysis show a significance value of 0.022 or $p < 0.05$, so that there is a relationship between the number of pesticides and balance disorders among respondents in Cipelem Village, Bulakamba District, Brebes City. The results of $RP = 3$ with a Confidence



Interval (CI) of 95% = 1,052 - 8,553 so that the prevalence of balance disorders of farmers using the type of pesticide > 3 mixtures is 3 times greater than the type of pesticide $\leq$ 3 mixtures.

E. Relationship between Pesticide Dosage and Balance Disorders in respondents to respondents

The results of the analysis show a significance value of 0.839 or $p > 0.05$, so there is no relationship between pesticide dose and balance disturbances in respondents in Cipelem Village, Bulakamba District, Brebes City. The result of $RP = 1.165$ with 95% Confidence Interval (CI) = 0.65 - 2.088.

CONCLUSIONS

1. From the examination of body balance disorders categorized by positive Romberg test and negative Romberg test based on the doctor's diagnosis, as many as 33 people (53.2%) had a positive Romberg test while 29 people had a negative test (17.68%). All farmers do not use complete personal protective equipment and pesticide storage is stored in the house.
2. There is a relationship between working tenure and balance disorders among respondents in Cipelem Village, Bulakamba District, Brebes City ($p = 0.049$).
3. There is a relationship between the duration of pesticide spraying and balance disturbances among respondents in Cipelem Village, Bulakamba District, Brebes City ($p = 0.042$).
4. There is no relationship between the frequency of pesticide spraying and the balance disturbance of the respondents in Cipelem Village, Bulakamba District, Brebes City ($p = 0.741$).
5. There is a relationship between the number of pesticides and balance disorders among respondents in Cipelem Village, Bulakamba District, Brebes City ($p = 0.022$).
6. There is no relationship between pesticide dose and balance disturbance of respondents in Cipelem Village, Bulakamba District, Brebes City ($p = 0.839$).
7. The results of multivariate analysis show that the variables that affect the incidence of balance disorders are respondents with a working period of > 20 years and a duration of spraying > 3 hours / day and the type of pesticide with a probability of 81%.



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