

Analysis Of Factors Related Cholinesterase Activities To The Family Farmers In Pattapang Sub District Of Malino

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ABSTRACT: Pesticides of systemic class widely used by farmers in Indonesia, including those in Kelurahan Pattapang, are organophosphates with profenofos as the active substance. The purpose of this study was to determine factors associated with blood cholinesterase activity in the families of horticultural farmers spraying organophosphate insecticides in Kelurahan Pattapang. Methods: This study was a quantitative and observational-analytical survey with a cross-sectional design. Population was the families of farmers spraying organophosphates, as much as 175 people. A sample of 92 people, consisting of 46 husbands and 46 wives, was selected by using the simple random sampling technique. Results: Results of the examination of blood cholinesterase activity showed an average value of 11400 U/L with a minimum value of 7304 U/L and maximum value of 16882 U/L. Results of the biner logistic regression analysis indicated that a poor personal hygiene had a 4-times higher risk for decreased cholinesterase activity compared with a good personal hygiene. The more the personal protective equipment (PPE) were used, the less the chance for cholinesterase activity (0.2 times), and for each one-hour increase in blood sampling and spraying interval the risk of ChE <11.400 would be increased by 1.4 times. Conclusion: Protecting the body by using PPE and keeping the body clean after having contact with pesticides can help the families of farmers to avoid from the decrease cholinesterase activity.

Keywords : families of farmers, profenofos, cholinesterase activity

1 INTRODUCTION

Systemic pesticides class is widely used by farmers in Indonesia; including farmers in sub district of Pattapang is organophosphate class. An organophosphate pesticide that entering to the human body through the digestive tract can inhalation, and through the skin. Organophosphate compounds most commonly associated with poisoning in humans by inhibiting the cholinesterase enzyme activity in the blood. South Sulawesi is a potential area is dominated by seasonal agricultural activities undertaken by the majority of the region in this area. Diverse cropping pattern applied to farmers based on rainfall and it's related with the land typology further to enrich the diversity of natural resource use (Gapoktan, 2009). Initial survey research location in the Village Pattapang to family farmers in this case husband and wife who mixing spray pesticides. Interviews showed that there are a lot of health problems experienced by farmers while and after spraying. The complaints such as headaches, vomiting, muscle cramps, even unconscious. Uncontrolled use of pesticides for pest control, protection equipment or personal protective equipment are inadequate at work, and the habit of washing hands at the time after contact with pesticides cannot be done by the farmers, so that need for the provision of understanding about pesticides dangerous on health.

2 MATTER AND METHOD

This research is a quantitative research is observational analytic survey with cross sectional study design to analyze factors associated with cholinesterase activity in blood of the family farmer. The study was conducted in December 2014-January 2015. The population of study was the entire farmer and farmer's wife with organophosphate insecticides spray horticultural in Sub district of Pattapang as many as 175 people. The result of the calculation, obtained a sample of 92 individuals from the population of farmers and farmers' wives each insecticide sprayers of 46 husbands and 46 wives. There

are two variables in this study. The dependent variable of this study is the cholinesterase enzyme activity in the blood while the independent variables namely age, gender (type of work), nutritional status, smoking habits, knowledge of the application of pesticides, personal hygiene, use of PPE, length of work, years of service, the use of insecticides, spraying frequency, and the distance between the spraying time and blood sampling. Technique of data collection was using interview techniques with questionnaires, observations with checklist, and documentation. Data analysis was using Kruskal wallis difference test, Spearman correlation test, and binary regression analysis.

3 RESULT

Table 1 Differences Cholinesterase Activity between Job type and Smoking Habit in Family Farmers in Sub Pattapang, Malino

Independent Variable	n	Median (Min-Max) Activity ChE	Dependent Variable: Activity ChE P (Mann-Whitney test)
The Work			
1. Spray (Male)	46	11792,5 (7125-16081)	0,662
2. Mixing (Female)	46	10995,5 (8001-16882)	
Smoking Habit			
1. Smoking	42	11777 (7125-16081)	0,410
2. No Smoking	50	10577 (7304-16882)	

Table 2 Relationship between cholinesterase activity with Respondent's Characteristics and Work in family Farmers in Sub Pattapang, Malino

Variabel Independen	n	Median (Min-Max) Activity ChE	Variabel Dependen Activity ChE	
			coefisien correlation rs	p
Age	92		0,023	0,827
BMI				
1. Obese	34	11479 (7259-16081)	-0,154	0,142
2. Normal	48	10047 (7304-16882)		
3. Thin	10	9032 (7125-12464)		
Knowledge of the application of pesticides				
1. Good	39	11682 (7304-16081)	0,056	0,596
2. Medium	46	11400 (7259-16882)		
3. Less	7	9885 (7125-12153)		
Personal hygiene				
1. Good	25	11818 (8075-16882) ^a	-0,359	<0,001
2. Pretty Good	36	11749 (7259-11594) ^a		
3. Poor	31	8825 (7125-16081) ^b		
Use of PPE				
1. Using 3	22	8439 (7125-12012) ^a	0,562	<0,001
2. Using 4	67	11720 (8075-16882) ^b		
3. Using 5	3	13721 (11683-16081) ^b		
Years Of service	92		0,245	0,019
Length of work	92		0,168	0,109
Frequency Spraying				
1. 2 times a week	40	9574,5(7125-15594)	0,328	0,001
2. 3 times a week	52	11882 (7259-16882)		
The use of insecticides				
1. 30 grams	25	9123 (7125-15594)	0,134	0,318
2. 40 grams	21	11424 (8356-16081)		
3. 800 grams	46	11690 (7259-16882)		
blood sampling distance and spraying	92		-0,502	<0,001

The results of relationship analysis based on table 2 shows that the variables age, BMI, duration of work, the use of insecticides, pesticides and knowledge of the application there was no correlation with cholinesterase activity with p-value > 0.05. Variable personal hygiene, use of PPE, work period, the frequency of spraying, spraying time and distance with blood sampling there is a relationship with cholinesterase activity with p-value < 0.05.

Table 3 Summary of Binary Logistic Regression Analysis of Factors Affecting the Family Farmers Cholinesterase Activity in sub district Pattapang, Malino

Independent Variable	B	Exp (B)	p-value
Body Mass Index (BMI)			0,861
BMI (Normal x obese)	-0,248	0,780	0,706
BMI (Thin x obese)	-0,541	0,582	0,606
Personal hygiene			0,028
PH (Pretty Good x good)	-0,183	0,833	0,773
PH (poor x Good)	1,567	4,793	0,029
Use of PPE	-1,829	0,161	0,010
Years of service	-0,017	0,984	0,506
Length of work	-0,165	0,847	0,618
Frequency Spraying	0,026	1,027	0,968
The use of insecticides	0,003	1,003	0,166
blood sampling distance and spraying	0,380	1,462	<0,001

Results of binary logistic regression analysis showed that the variable use of personal protective equipment, personal hygiene, and blood sampling distance and spraying effect on cholinesterase activity in blood with p value < 0.05. The correlation coefficient (B) the use of PPE is a perfect negative correlation, which means that the more the amount of PPE is used, it will reduce the chances of Che < 11,400 at risk by 0.1 times. The correlation coefficient (B) personal hygiene with bad category x well, show a perfect positive correlation, which means that the poor personal hygiene, it will increase the risk by 4.7 times Che < 11,400 and correlation coefficient (B) distance and spraying blood sampling showed a correlation positive, which means that the longer the distance of blood sampling and spraying it will increase 1.4 times che < 11,400.

4 DISCUSSION

The results of the examination of cholinesterase activity in the blood of 92 respondents, the average obtained in the blood cholinesterase activity of the respondents were in the value of 11 400 U/L with a minimum value of 7125 U/L and the maximum value of 16 882 U/L. Based on the reference value of 92 respondents, no respondents from the results of cholinesterase activity in the blood is below the reference value. The results of correlation analysis between respondent characteristics (age, gender, body mass index, and smoking habits) with cholinesterase activity in the blood, there is no relationship with the variables contained in the blood cholinesterase activity with p-value > 0.05. There are several barriers at the meeting place (junction) between cells. If the junction cells slacken, providing an easy way for toxic substances to enter the cell or organ. For the barrier between blood and brain, connected by endothelial cells and xenobiotics which are lipophilic (fat soluble) will easily cross the endothelial cells and enters brain tissue. Babies do not have a strong bond between the cells, making it more sensitive to toxic substances than in adults. Although the placenta has a strong barrier, but the materials are lipophilic still can cross (Mukono, 2010). Overall the sample of this study is an adult farmer. So that, there is no difference in the results of cholinesterase activity. Sex between men and women has a normal number of different cholinesterase activities. In this study, there was no difference of cholinesterase activity by sex for both of men and women as spraying insecticides as mixing insecticides have the same risk of exposure to insecticides during the work. The habit of smoking can give risk for poisoning through oral. The results showed that most respondents are passive smokers and based on the observation, respondents who were active smokers and non-smokers at work. Based on the results of correlation analysis, smoking is not an association with cholinesterase activity, but more emphasis on when and where the respondent smoked. The results showed that there was no correlation between BMI with cholinesterase activity in the blood. Organophosphate compounds generally dissolve well in fat. Toxicant that is high in fat solubility allows low concentration in the target organ, so it can be considered as a protection mechanism. The toxicity in people who are obese is lower when compared to thin people (Mukono, 2010). The results based on the characteristics of the job, variable personal hygiene, use of PPE, work period, the frequency of spraying, and blood sampling distance and spraying there is a relationship with the cholinesterase activity in the blood. As for the variable length of work, the use of insecticides, pesticides and knowledge of the application there was no correlation with the value of p > 0.05. Per-

sonal hygiene is one of the most important things in an effort to protect themselves from exposure to pesticides. The results showed an association between personal hygiene with cholinesterase activity in the blood. There are three components that are included in the assessment in this study related to personal hygiene habits of respondents to wash the body immediately that has been in contact with the pesticide, wash your hands and mouth before eating, drinking, or smoking, and customs of the respondents to change and wash clothes after work. The main pathway for absorption Xenobiotic is the gastrointestinal tract, lungs, and skin. But the accidental poisoning or exposure toxicology studies Xenobiotic can occur through injection, such as intravenous, intramuscular, subcutaneous, intraperitoneal, and other injection lines. One thing that became very important in the use of pesticides is the use of personal protective equipment. The results showed that there is a relationship between the uses of personal protective equipment with cholinesterase activity. In general, personal protective equipment used by respondents is personal protective equipment not meeting the standards, in particular on the use of masks and gloves when working. However, due to the annual air temperature in the Village Pattapang average range between 17°C-20°C with an average annual minimum temperature of 15°C-17°C in December / January to benefit the respondent as at work. In addition, advantages to the cold temperatures make the pores of the skin in this case as one of Xenobiotic entrance into the open state is not also in the use of PPE, especially long-sleeved work clothes are made of thick material such as a jacket because the relatively cool temperatures. Length of working in this research is the length of the respondents work in a matter of years. Based on the results of the study, showed a statistically significant association between tenure with cholinesterase activity allows respondents to the longer work as a farmer, the more frequent contact with pesticides so that the risk of higher pesticide poisoning. Length of working in the old agricultural activities allows the respondent to undergo continuous exposure to pesticides, so the potential for accumulation of pesticide residues in the body, which in turn will decrease the levels of cholinesterase. Several organophosphate pesticides in the body are converted into intermediates are more toxic before pesticides are metabolized (Siswanto, 2012). Length of working referred of this research is the length of the respondents work with pesticides in a day. Based on the research results, length working of respondents an average of 3 hours /day with a minimum of 2 hours of working time and maximum working time 4 hours/day. The results showed that there was no correlation between the lengths of employment with cholinesterase activity. Frequency of respondents to contact with pesticides is between 2 to 3 times in a week. Based on the results of the study, indicate that there is a relationship between the frequencies of spraying with cholinesterase activity in the blood. The length of time it takes for cholinesterase levels return to normal depends on the type and level of intoxication itself. Results of research on farmers in Pacet, West Java, that breaks one week can increase the activity of cholinesterase in farmers spray, break of at least 1 week on the subject mild poisoning can raise cholinesterase levels to normal (87.5%), whereas subjects with moderate poisoning takes longer to reach normal cholinesterase activity (Raini, et al 2009). The use of insecticides in this study is the number of insecticides used by the respondent in a matter of grams per day. The results showed that there was no correlation between the uses of insecticides with cholinesterase activity in the blood.

In general, the amount of insecticide used in a day is closely related to the amount of insecticide into the body of respondents at work. Profenofos is a chemical compound that is able to irritate the eyes and skin in experiments conducted on rabbits. Which takes 24 -48 hours irritate the eyes and 24-72 hours irritate the skin (Siswanto, 2012). Blood samples to measure the activity of cholinesterase, post-exposure taken with different distances. On average respondents blood sample 5 hours after spraying with minimum blood sampling is 1 hour after spraying blood sampling and the maximum is 10 hours after spraying. Visible differences in the value of cholinesterase activity of the respondents that the longer distance with the blood sampling after spraying, the closer the minimum value of cholinesterase activity which ranged in value of 7000 U/L. In this case, Researchers cannot measure what percentage of the decline in pre-exposure to post-exposure because researchers did not conduct checks on pre-exposure. However, if you see the results of the examination after exposure, it can be seen that the longer the intoxication process takes place, the lower value of cholinesterase activity in the respondents.

CONCLUSIONS

Based on the results and discussion can be obtained conclusion that equip our self with APD and maintain hygiene after contact with pesticides can help family farmers to avoid a decrease in cholinesterase activity.

SUGGESTION

The government in this case South Sulawesi Provincial Health Office to conduct periodic checks of cholinesterase activity in a family of farmers, farmers provides insight to the dangers of pesticides and pesticide application a good way.

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