18. Knowledge, attitudes, and practices of pesticides use

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Knowledge, Attitudes, and Practices of Pesticides Use Toward the Cholinesterase Enzyme in Vegetable Farmers

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ABSTRACT

Background: Vegetable is a plant that has a high economic value but susceptible to pests and diseases. Pests are mainly controlled with insecticides, but the uses frequently do not follow the rules that jeopardize the health of the farmers.

Method: This cross-sectional survey applied method of data analysis with the chi-square test. Population in this study was 31 farmers who used pesticides and willing to give blood samples out of 78 in Bogor, Indonesia. This study aimed to get an overview of the characteristics of pesticides users, behavior in the form of knowledge, attitudes, practices in the use of pesticides and the effects on their health.

Results: This study showed that there is no correlation between knowledge and attitude of farmers' pesticide users with cholinesterase enzyme activity. In the other hand the practice of using pesticides by farmers associated with cholinesterase enzyme activity in the blood.

Conclusion: In increasing the knowledge, attitudes, and practices the management of pesticides, farmers should be given technical training on safe pesticide management. Department of Agriculture and the local Health Department is also expected to supervise regularly about the activity of the use of pesticides by farmers.

Keywords *- cholinesterase enzyme, farmers, pesticide, knowledge, attitudes*

INTRODUCTION

The use of pesticides not meeting the rules will lead to human health mainly in farmers. Factors that influence the occurrence of pesticide poisoning is a factor of the body (internal) and from outside the body (external). Internal factors include age, gender, genetics, nutritional status, the level of knowledge and health status. The elements from outside include types of pesticides, pesticide dose, the frequency of spraying, duration as sprayers, length of spray, the use of personal protective equipment, handling pesticides, the last contact with the pesticide, the height of plant, ambient temperature, the spraying time and the action against the direction of the wind [(1),(2)].

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These factors were largely ignored by farmers in Indonesia, especially in rural areas. They do not pay attention to the impact resulting from the work they do every day with a variety of reasons. Therefore, this article discusses on the disease that may lead from the action, primarily as farmers to increase knowledge and awareness about various conditions that they can prevent and minimize the problem either illness or poisoning due to pesticides.

This study aimed to investigate the relationship between the level of knowledge, attitudes, and practices of farmers in the use of pesticides with blood cholinesterase activities in a village of Bogor Regency, Indonesia.

METHODOLOGY

This study used cross-sectional design. The research car-

ried out firstly by distributing questionnaires to identify the level of knowledge, attitudes, and practices of pesticide use which includes the characteristics of the dose, the amount of pesticides used, protective equipment used, length of work of farmers, the frequency of spraying, spraying method, a method of mixing the pesticide. The next stage farmers are given counseling about the use of pesticides correctly. After the post-test, advice was given, followed by blood sampling for blood cholinesterase level checks with Tinto meters. Test principle of the tests is blood containing cholinesterase enzyme liberating acetic acid from acetylcholine so that it will change the pH of the solution (mixture) of blood and indicators.

The population is all existing vegetable growers in Cikarawang Village, Bogor Regency as many as 71 people and a sample obtained was 38 farmers. The blood samples used were as much as 0:01 mL of peripheral blood (10 mL) taken from the fingers.

The description was categorized into the following:

Table 1: Cholinesterase test results description

No	Percentage of measurement results	Description
1	100% -75% of the normal	No action, but need to test again shortly
2	75% -50% of the normal	Maybe overexposure: test again, keep it away from the work with organophosphate pesticides for two weeks and test to recovery
3	50% -25% of the normal	Serious over-exposure: test again, keep it away from all the work with organophosphate pesticides, if the pain occurs, the patient is taken to the doctor (medical check)
4	25% -0% of normal	Very Serious over-exposure: test again, keep it away from the work with organophosphate pesticides until the results of the medical check

Data collected were then tabulated and analyzed descriptively. Bivariate analysis was performed with Chi-square test to see the relationship between variables.

RESULTS

The results of the examination of blood cholinesterase activity have shown that 75% -100% of the normal category is seven people (18.4%), and toxicity category is 31 people (81.6%). The entire respondents are male (100%), 29-43 years of age is 8 people (21.1%), aged 44-58 are 18 people (47.4%) and 12 (31.6 %) is aged 59-73 years.

No school education totaling 3 (7.9%), totaling 20 people completed primary school (52.6%), junior high school graduation totaling 3 (7.9%), and 12 (31.6%) completed high school education. Length of work <10 years amounts to 10 persons (2.6%) and ones with ≥10 years of service is 28 people (73.7%).

The frequency of use of pesticides in the category of rare (<1 time/week) are 17 people (44.7%), and in the class of frequent (≥1 times/week) are 21 (55.3%). Those who follow the rules of use of pesticides on the packaging are 13 (34.2%), and the dose of not appropriate is performed by 25 people (65.8%).

Farmers apply one type of pesticide are 16 (42.1%), and those mixing with other pesticides are 22 people (57.9). The use of personal protective equipment in a whole category is performed by 11 farmers (28.9%), and incomplete apparatus is implemented by 27 people (71.7%).

In spraying method, those in keeping with the direction of the wind are 10 (26.3%), and those do not conform (contrary to the wind direction) are 28 people (73.7%). Of the total respondents 38 people (100%).

During pretest, those with the proper category on knowledge are 29 persons (76.3%), 8 (21.1%) are with pretty functional class, and 1 (2.6%) is too weak education. After counseling, in posttest 33 farmers (86.8%) change into proper category, four people (10.5%) are under a pretty adequate class, and 1 (2.6 %) remains in the weak grade.

In attitude, during pretest, those behave positively are 32 people (84.2%) and negative ones are 6 (15.8%). However, in posttest attitude, all 38 respondents (100%) shows a favorable view.

In practice of using pesticides, during pretest,

those who perform well are 33 (86.8%), four people (10.5%) are pretty good, and 1 (2,6%) people do not act. However, in posttest, 36 people (94.7%) turn into performing well, and 2 (5.3%) farmers make it pretty good.

Statistical test on knowledge of farmers to the cholinesterase activity indicates p-value = 0.774. Thus, it is concluded that there is no relationship between the level of expertise with cholinesterase activity. Statistical test on farmer's attitude towards cholinesterase activity denotes p-value = 1.000. So it is concluded that there is no relationship between attitude and cholinesterase activity either. However, amount of doses to cholinesterase activity indicates p-value = 0.038 suggesting there is a relationship between the use of prescriptions to the cholinesterase activity. Further, in this area, the odd ratio value of 1.4 means the person using the appropriate dose, will have 1.4 times the risk of possibly not being poisoned than people not using the proper dosage.

Statistical test on the amount of pesticide use (mixing) to the cholinesterase activity obtains p-value = 0.425. Therefore, it is concluded that there is no association between the blend of pesticides with cholinesterase activity. The odd ratio value of 0.5 indicates that people who use a mixture of pesticides have 0.5 times the risk of poisoning than those that use a single pesticide.

The test results protective equipment usage statistics on the activity of blood cholinesterase farmers obtained p-value = 0.648 it can be concluded that there is no association between the use of personal protective equipment with cholinesterase activity. From the analysis results obtained Odd Ratio value of 3 means that people who use personal protective equipment are not complete at risk for poisoning three times compared to people who use the full own protective gear.

The frequency of farmers in spraying to cholinesterase activity obtains p-value 0.125 indicating that there is no correlation between the rate of spraying with cholinesterase activity. Odd ratio = 0.25 means a person who rarely spray the pesticide, having 0.25 times the risk of poisoning than those who frequently spray.

Spraying method to blood cholinesterase activity of farmers generates the p-value = 0.072 indicating that there is no relationship between the practice of spraying to the cholinesterase activity. Further, the statistical result suggests there is no correlation between the age group with cholinesterase activity proved with p-value = 0.248. A similar effect is also found in the education to the level of blood cholinesterase (p-value = 0.167), and there is no association between the length of work to cholinesterase activity (p-value = 0.351). The value of the odd ratio = 0.4 means a person who has long worked will have possibility 0.4 times the risk of poisoning than the ones who have just started working.

DISCUSSION

Overview of farmers behavioral variables consisting of knowledge, attitudes, and actions reveals that farmers' knowledge about the use of pesticides in large part on the results of the pretest are knowledgeable (76.3%) and increased into 86.8% during posttest. The farmers also have the attitude with a positive category (84.2%) which grow into 100% during posttest. Even though the farmers are knowledgeable, but there are still many who are poisoned indicating with the results of blood cholinesterase activity under toxicity category which is as of 31 people (81.6%).

The level of knowledge is a supporting factor in implementing activities because the experience is one of the first considerations in behavior. Cognitive domain knowledge is a very important for the formation of a person's actions. Empirical evidence and research proved that the response based on experience would be viewable directly from behavior not based on knowledge[3]. Knowledge is an essential factor in behavior change. Therefore, the knowledge in the use and management of pesticide impacts on the reduction of blood cholinesterase activity [4]. Attitude is a response that is still closed to the stimulus or objects and is also predisposing of a behavior action.

To increase the amount of agricultural production, one way to combat pests, weeds, and diseases is with intensive use of pesticides for programs supporting food needs. The dependence on pesticide will increase the dose of pesticides [5].The most significant danger when the application of pesticides is the mixing time due to a mix working with the concentrate. Since mixing pesticide is in the tank sprayers, it is hard to tell whether the pesticides and water have been mixed correctly or not. To ensure safety, wearing protective clothing, masks (respiratory protection) and rubber gloves are encouraged [6].

Personal protective equipment is a set of tools workforce used to protect part or all of body from the potential hazards or workplace accidents [7].A large proportion of pesticide enters the body if clothes are not changed after spraying by 64.72% possibility [8]. No shower after spraying has a proportion of 55.88% increasing possibility of pesticide poisoning. The more often the farmers do spraying with pesticides, the higher the opportunity for the occurrence of toxicity [9],[10]. The time needed to make contact with the pesticide is maximum of 5 hours per day. The high frequency of spraying affect some pesticides enter the body, pass through the respiratory tract (mouth and nose) or the skin (inhalation). If spraying is done with high frequency without any personal protective equipment, it will affect farmers' cholinesterase [11].

Age affects the physical, mental, willingness to work and individual responsibility. Young adult workers are believed to be able to build health by preventing a disease or disorder cope with the virus. To perform these activities, young workers will be more disciplined to maintain their health while the older worker will have deliverance and freedom in social life [12].

Formal education is a significant influence in opening insight and understanding of the new values in the environment. A person with a higher education level will be more comfortable to understand the changes in context, and they will absorb these changes. However, someone who never attended formal education is expected to be more accessible to accept and understand the message of health messages through counseling and the mass media [3].

The binding of the enzyme cholinesterase by pesticides is reversible so that the levels cholinesterase can return to normal or near-normal conditions[8]. The decrease of cholinesterase plasma levels will return to normal within three weeks, while in the blood needs approximately two weeks with no exposure back.

CONCLUSION

In the setting of Indonesian farmers, the behavior of right knowledge, the right attitude and good practice in the use of pesticides have nothing to do with the cholinesterase activity. However, the excellent knowledge, positive attitude, and good manners have the lower incidence of toxicity compared to farmers who do not.

Blood test results of cholinesterase activity from 38 respondents have shown that seven farmers (18.4%) have a standard category, and toxicity category is 31 farmers (81.6%).

Factors affecting the activity of cholinesterase blood of farmers are dose, amount of the mixture, frequency, use of personal protective equipment, method of spraying and behavior (knowledge, attitudes, and actions) farmers in the use of pesticides.

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Ethical Clearance: Before conduct of the study written permission was obtained from Politeknik Kesehatan Kementrian Kesehatan Jakarta, Indonesia. Consent and willingness were established from all the subjects who meet inclusion criteria of this study.

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