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THE CORRELATION OF CHOLINESTERASE ENZYME ACTIVITIES BASED ON AGE IN MALE FARMERS

Prasanti, Tri Harningsih*
Sekolah Tinggi Ilmu Kesehatan Nasional, Jl. Raya Solo - Baki, Bangorwo, Kwarasan, Kec. Grogol, Kabupaten Sukoharjo, Central Java 57552, Indonesia
*tri.harningsih@stikesnas.ac.id

ABSTRACT
The use of pesticides to control plant pests can have an adverse impact on the health of farmers and the surrounding environment. Pesticides enter the body through the respiratory tract and unprotected skin. Pesticide poisoning can cause a decrease in cholinesterase enzyme activity in the blood which can cause death. The purpose of this study was to determine whether there was a relationship between cholinesterase enzyme activity based on age in male farmers in Kadibolo Village, Klaten Regency. This type of research is analytic observational. The sampling method used was simple random sampling technique. This study used a cross sectional study design with a sample of 20 farmers. Samples were taken from farmer's venous blood and stored in a vacuum tube without yellow anticoagulant then centrifuged to collect serum. Measurement of cholinesterase enzyme activity using Roche Cobas c 501. The variables of this study were age and cholinesterase enzyme activity of male farmers in Kadibolo Village. The results of statistical tests with SPSS using Fisher's exact test obtained p value = 0.447, RP value = 0.333 and 95% CI = 0.025-4.401. There is no relationship between cholinesterase enzyme activity and age in male farmers in Kadibolo Village.

Keywords: age; cholinesterase; farmer; pesticide

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INTRODUCTION

Agricultural activities cannot be separated from pest control. Pesticides are chemical compounds that are widely used with the aim of controlling pests in the form of insects, rats, fungi, nematodes, mites, fleas, molluscs, and weeds or unwanted plants. Pesticides are relatively toxic materials, so poisoning cases often occur (Rahayu, M., & Solihat, M.F., 2018). Pesticides can be classified based on their active compounds, namely organophosphates, organochlorines, carbamates and pyrethroids. Organophosphate (OP) poisoning is a global health problem with one million serious poisonings annually. As a result, 200,000 people died, with most of the deaths occurring in developing countries (Hidayati, D.B.I., 2019).

Pesticides can enter the body through digestion, inhalation and through unprotected skin surfaces. The severity of the toxicity is related to the level of cholinesterase inhibition in the blood. The cholinesterase enzyme is an indicator of high and low levels of poisoning (Yulianto & Amaloyah, N., 2017). One of the causes of decreased levels of cholinesterase is the age factor. The age of a person increases, the longer the working period with pesticides, so that it has an impact on the number of exposures that cause the effectiveness of the immune

system to decrease and affect the body to overcome the toxicity of a substance (Utami, T.P., et al., 2021).

Oktaviani, R., & Patangan, E.T. (2020) research, with bivariate analysis using the chi square test, obtained a p value of 0.035, indicating that there is a significant relationship between age and symptoms of pesticide poisoning in greenhouse farmers in Bandungan District, Semarang Regency. Research conducted by Hermawan, I., et al (2018), stated that there was a relationship between age and blood cholinesterase levels of guava farmers in Pesaren Village, Sukorejo, Kendal with Fisher's Exact test p value = 0.001 and RP = 19.500. Research by Hardi, et al.(2020), stated that there was a relationship between decreased blood cholinesterase levels of Vegetable Farmers in Jenetallasa Village, Rumbia District, Jeneponto Regency with the duration of spraying, p value = 0.021, working period p = 0.009 and spraying frequency p = 0.039 using the chi square test. . Research Pratama, D.A., et al.(2021), in Sembalun Lawang, Sembalun, East Lombok stated that there was a relationship between decreased levels of cholinesterase with working period p value = 0.026, spraying time of more than two hours p value = 0.025 and frequency of spraying three times or more p value = 0.034 using the chi square test.

A very sensitive and commonly used method for the determination of cholinesterase is described by Ellman et al., based on the hydrolysis of substrates of thiocholine acetyl and butyrylthiocholine or others. After enzymatic hydrolysis, the relevant acid and thiocholine were released and thiocholine by its SH group was detected using 5,5'dithiobis-2 nitrobenzoic acid to form 5-mercapto-2- The nitrobenzoic anion was determined spectrophotometrically at 412 nm (Rahayu, M. & Solihat , M.F., 2018). Roche Cobas c 501 is a chemical test instrument with a modular type analyzer which is a combination of chemical test equipment modules consisting of a control section, a core section, and an analysis module. This chemical test kit can be used according to what is needed, such as the choice of modules used, the number of modules, and the specific analytes placed in each module (Jenica, A., 2019). The purpose of this study was to determine whether there was a relationship between cholinesterase enzyme activity and the age of male farmers in Kadibolo Village, Klaten Regency.

METHOD

This research is a type of analytic observational research cross-sectional study design, namely a study that studies the correlation between exposure or risk factors (independent) with consequences or effects (dependent), with data collection carried out simultaneously at one time between risk factors. with the effect. (Masturoh, I. & Anggita, N. T., 2018). The population of this study were 20 male farmers in Kadibolo Village, Klaten. The sampling technique used is simple random sampling. It is said to be simple (simple) because every individual in the population has the same opportunity to be sampled. (Masturoh, I. & Anggita, N. T., 2018). The independent variable in this study was the age of male farmers. The dependent variable in this study was the activity of the cholinesterase enzyme.

The source of the research data was obtained from primary data through filling out questionnaires and examining cholinesterase activity in the blood of farmers in Kadibolo Village, Klaten Regency. The cholinesterase enzyme activity was checked by taking farmer's serum and sent to the Prodia Surabaya Clinical Laboratory at a temperature of 4-8ºC, then the cholinesterase enzyme activity was checked using a Roche Cobas c 501 tool. The working principle of the colorimetric test using a Roche Cobas c 501 instrument is that Cholinesterase catalyzes the hydrolysis of butyrylthiocholine into thiocholine and butyrate. The thiocholine

rapidly reduces the yellow hexacyanoferrate (III) to almost colorless hexacyanoferrate (II). This change in color intensity can be measured photometrically (Roche, 2017).

RESULTS

The age of male farmers who were respondents in this study were grouped into several categories to determine the age description of the respondents. The distribution of the age frequency of respondents in this study can be seen in table 1.

Table 1.
Age distribution of farmers (n=20)

Age (Years)	f	%
30 - 39	3	15
40 - 49	1	5
50 - 59	9	45
60 and above	7	35

The age of farmers according to the table above is at most 50-59 years old, 9 people or 45%, then 7 people and over 60 years old or 35%, then respondents aged 30-39 years are 3 people or 15%. The age of the respondents who are at least in the age category of 40 - 49 years is 1 person or 5%. The variables of respondent age and cholinesterase enzyme activity are presented in table 2 to give a brief description of the data obtained in the study which can be seen in table 2.

Table 2.
Frequency distribution of farmers' age and cholinesterase activity (n=20)

Category	f	%
Usia		
≤ 54 tahun	5	25
> 54 tahun	15	75
Cholinesterase		
Normal	18	90
Abnormal	2	10

Table 2 shows that from 20 farmers there are 5 people or 25% of respondents aged up to 54 years and 15 farmers aged 54 years and over or 75% of respondents so that it can be concluded that the majority of respondents are 54 years old and over.

DISCUSSION

The results of the measurement of cholinesterase enzyme activity were divided into two categories, namely normal and abnormal categories. The cholinesterase enzyme activity of respondents from farmers in Kadibolo Village was on average normal where 18 respondents or 90% of respondents were in the normal category and 2 people or 10% of respondents experienced abnormal or abnormal cholinesterase enzyme activity. The results of measuring the cholinesterase enzyme activity of farmers in Kadibolo Village obtained normal results, namely as many as 18 respondents or 90%. Abnormal results if the value is less than 5,320 U/L or more than 12,920 U/L. The results with abnormal values were 2 respondents or 10%.

The results of the Fisher's exact test statistic obtained p value = 0.447, the magnitude of the risk is indicated by the value of RP = 0.333 and 95% CI = 0.025-4.401. So it can be concluded that there is no relationship between cholinesterase enzyme activity with age in

male farmers in Kadibolo Village, Klaten Regency. Research by Tutu, et al (2020) shows that a person's age, although still classified as productive, if in carrying out work does not follow safety procedures at work continuously, it can lead to health problems. Farmers are known to often increase the pesticide dose beyond the recommended so that the pesticide works better so that it affects the activity of the cholinesterase enzyme even though the age of the farmer is still relatively young.

Respondents with high cholinesterase activity in this study were 61 years old with 4 years of service as farmers. This respondent sprayed 2 times during the rice planting period with a spraying time of 2 hours. Another respondent with high cholinesterase activity is 51 years old with 25 years of work as a farmer. This respondent sprayed 2 times during the rice planting period with a spraying time of 2.5 hours. The age of the oldest respondent is 63 years with a total of 4 people with normal cholinesterase activity. Respondents with the longest working period of 45 years sprayed 3 times during the rice planting period with a spraying time of 3 hours also had normal cholinesterase activity. This indicates that there are other factors that cannot be controlled in this study that cause high or abnormal cholinesterase activity. Other factors that cause high or abnormal cholinesterase activity may be investigated by further researchers, for example the suitability of pesticide use, spraying method, spraying direction. Farmers' knowledge and attitudes towards the use of pesticides as well as increasing the number of research samples may also be carried out.

Age factor is not related to cholinesterase enzyme activity in this study, one possibility is due to the use of PPE by farmers in Kadibolo Village with a good category of 55%. The use of PPE by farmers, even though it reaches more than 50% according to the author, is still lacking. Farmers' awareness to use PPE needs to be increased with counseling and supervision by the relevant agencies so that the risk of using pesticides is minimal. Pesticides can enter through the respiratory tract (mouth and nose) or through the skin if spraying is carried out without the use of PPE. Farmers also need to get education about the dangers of pesticides so they can be careful in using pesticides (Oktaviani, R. & Patangan, E.T., 2020).Faktor lain penyebab usia tidak berhubungan dengan aktivitas *cholinesterase* kemungkinan karena frekuensi penyemprotan oleh petani dilakukan sebanyak 2 kali atau 55% dan 45% melakukan 3 kali penyemprotan selama masa tanam. Frekuensi penyemprotan petani di Desa Kadibolo masih dalam batas normal.

The duration of pesticide spraying by farmers in Kadibolo Village is majority or 85% carried out for less than 3 hours and 15% for 3 hours. The duration of spraying by farmers in Kadibolo Village is still within normal limits. Lucki, F.D. (2018) states that the duration of spraying should not exceed four hours per day of the week. Workers who administer pesticides should not be exposed to more than 5 hours a day and 30 hours a week. The longer the spraying, the higher the pesticide exposure, so the risk of poisoning by Yuandra's research. R.F.(2019) stated that spraying time of more than 4 hours per day was associated with cholinesterase enzyme activity with a p value = 0.021 RP = 2,700 (95% CI = 1.107-6.585) in line with the research of Suparti, S., et al.(2017) for the variable spraying time of 2 hours or more was significant with p value = 0.001; OR = 5,556 and 95% CI = 2,106-14,653 with Chi square test.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that there is no significant relationship between age and cholinesterase enzyme activity in male farmers in Kadibolo Village, Klaten Regency.

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