Indonesian Journal of Global Health Research
Volume 6 Number S5, October 2024
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

ANALAYSIS OF CHOLINESTERASE AND SGPT LEVELS IN BLOOD IN FARMERS USING PESTISIDA

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ABSTRACT
Pesticides can enter the body through inhalation, so to find out poisoning or exposure to pesticides in the body, it is necessary to check Cholinesterase levels. The accumulation of pesticides in the liver triggers an increase in the number of free radicals and results in damage to hepatocyte cells and increases SGPT levels. The purpose of this study was to the levels of cholinesterase and SGPT in farmers who use pesticides. The research metodes, This type of analytic observational research with a cross-sectional study design. Total sample of 20 people selected by quota sampling. The results showed that the cholinesterase levels of the respondents were obtained between 6985 U/L to 12489 U/ and the SGPT levels of 19 respondents were 4 U/L – 42 U/L and 1 respondent had SGPT levels of 52 U/L. The cholinesterase levels of 20 respondents were within normal limits, namely less than 12920 U/L, while the SGPT levels of 19 respondents were within normal limits of less than 59 U/L and 1 respondent exceeded the normal limits of more than 50 U/L.

Keywords: cholinesterase; pesticide; SGPT

How to cite (in APA style)
Setyawan, I. G. Y., Purwati, P., & Harningsih, T. (2024). Analaysis of Cholinesterase and SGPT Levels in Blood in Farmers Using Pestisida. Indonesian Journal of Global Health Research, 6(S5), 641-648. https://doi.org/10.37287/ijghr.v6iS5.4494.

INTRODUCTION

Indonesia is known as an agrarian country with a large portion of its population working in the agricultural sector, which has vast agricultural land and diverse and abundant natural resources. In agrarian countries, agriculture plays a very important role in meeting basic needs; in addition, agriculture significantly contributes to boosting the economy, social sector, and trade. The area of agricultural land in Indonesia in 2019 was 7,463,948 hectares, in Bali Province the area of agricultural land is 70,006 hectares and in Gianyar Regency the area of agricultural land is 11,781 hectares (Ministry of Agriculture, 2020).Therefore the agricultural sector must need to be developed along with the increase in population and technological developments in order to increase the production of agricultural products.As an agricultural country, the use of pesticides in Indonesia is quite high. In 2006, about 1,336 formulations and 402 active ingredients of pesticides were registered to control pests in various commodity fields. Pesticide Action Network Asia and the Pacific (PANAP) stated in the results of its research on the dangers of pesticides in Wonosobo, Central Java as a pilot site for monitoring in the Asian region, from August to October 2008 showed that out of 100 respondents, there were 6 people, consisting of 2 women and 4 men experiencing health problems (Aeni et al., 2020).

Almost every day thousands of farmers and workers in the agricultural sector can be exposed to pesticides and every year it is estimated that millions of people working in agriculture can be poisoned by pesticides. The World Health Organisation (WHO) predicts that in 2009 in India, about 600,000 cases and 60,000 deaths occurred and those most at risk are children,

women, workers in the informal sector and poor farmers. In 2008 in Bangladesh, pesticide poisoning was the highest causing 4 deaths. In Cambodia, at least 88% of farmers experience acute effects of pesticide poisoning, in China, about 53,000 to 10,000 experience cancer, disability, infertility, and hepatitis each year as a result of pesticides (Aeni et al., 2020). Pesticides can enter the body through inhalation so that to determine poisoning or exposure to pesticides in the body, it is necessary to check blood Cholinesterase levels in farmers. Blood cholinesterse activity is the amount of active Cholinesterase enzyme in blood plasma and red blood cells that play a role in maintaining the balance of the nervous system. Blood Cholinesterase levels can be disturbed when spraying due to organophosphate and carbamate pesticides. These groups of pesticides will bind to the Cholinesterase enzyme, so that Cholinesterase becomes inactive and achethilcholine accumulation occurs. This situation will cause nervous system disorders in the form of increased cholinergic activity continuously due to achethicholin that is not hydrolysed. This disorder is then known as signs or symptoms of poisoning which not only occurs at the nerve endings but also in nerve fibres (Hardi et al., 2020).

The liver is one of the target organs of pesticides. The impact of the use of pesticides if they enter the liver can cause disturbances in the liver. The concentration of the enzyme SGPT in the blood can increase if there is a response to damage to the liver (Widarti & Nurqaidah, 2019). Serum Glutamic Pyruvic Transaminase (SGPT) is an enzyme whose presence and levels in the blood are used as markers of impaired liver function. The enzyme is normally present in liver cells. Damage to the liver will cause the liver enzyme to escape into the bloodstream so that its levels in the blood increase and indicate impaired liver function (Utami, 2019). The use of pesticides can harm humans, the organ system in the body will affect the level of pesticide poisoning for humans. Symptoms of pesticide poisoning range from mild symptoms such as skin irritation to severe symptoms such as headaches dizziness and vomiting (Kasamba and Eklo, 2018). Pesticide poisoning can occur anywhere, acute toxicity of pesticides will produce adverse effects after direct exposure, namely several hours or days and chronic toxicity of pesticides produces adverse effects on health in the long term (Sanchez, Colomina, Herrero, 2016) pesticide poisoning, for example organophosphate class pesticides where these pesticides can cause severe poisoning symptoms such as seizures, coma and the worst effect is death (Dalas, Koutroubas, 2019).

Plasma CHE screening is useful to identify exposures due to organophosphates or carbamate insecticides. CHE testing can also be used prior to anesthesia with the use of succinylcholine (muscle relaxant) type drugs to rule out genetic CHE deficiency disorders. This is commonly done in individuals who have a family history of prolonged anesthesia effects. (Yuandra, 2019). Guwang Village is included in the administrative area of Dinas Guwang Village, Sukawati District, Gianyar Regency, Bali Province. The total area of Guwang Village is 2,785 km which is divided into seven official banjars namely Banjar Buluh, Banjar Sakih, Banjar Dangin Jalan, Banjar Wangbung, Banjar Tegal, Banjar Tagtag and Banjar Manikan. The area of rice fields reaches 343 ha where the majority of the population works as craftsmen, traders and farmers. Farmers in managing agriculture are divided into two agricultural fields, namely wetland and dryland agriculture. Existing wetlands are managed for rice cultivation, and drylands are planted with vegetables for daily basic needs.

During the rice planting schedule, farmer groups usually use pesticides to avoid nuisance pests that can damage rice plants. The use of organophosphate pesticides has been carried out from year to year with a spray duration of 3 hours - 5 hours in one day and the dose of pesticide use by some farmers who do not follow the rules of use according to what is stated

on the packaging and plus the low awareness of farmers in using PPE can affect health to themselves, as for complaints that are often felt by farmers including feeling shortness of breath, dizzy head, nausea and eye irritation.Based on how it works (Mode of action), namely according to its chemical properties, pesticides are divided into four major groups, namely: Organochlorine, Organophosphate, Carbamate, Pyrethroid (Hudayya & Jayanti, 2012). Based on the background that we have described, our study aims to determine the cholinesterase levels and SGPT levels of farmers who use pesticides.

METHOD

The research design used was Observational analytic with cross-sectional approach. cross sectional, namely by studying the correlation between the independent variable and the dependent variable observed at the same time (Masturoh, 2018).The research was conducted in Guwang Village, Sukawati District, Gianyar Regency. The population in this study were 20 rice farmers using pesticides who were suspected of being exposed to pesticides. The research sample studied was serum obtained from the process of taking venous blood from farmers who used pesticides with SST vacutainer tubes (Serum Separator Tube) which were then centrifuged. The blood obtained was then allowed to stand for 30 minutes with the help of a stopwatch. The clotted blood was then centrifuged for 10 minutes at 4,100 rpm. Serum that has been separated is then pipetted and transferred to another test tube (Laila, 2018). The serum samples obtained were sent to the laboratory using a sample container with a temperature of 2-8°c and serum samples were ready for examination. Quota sampling technique. The measuring instrument uses a questionnaire. The materials used in this study are as follows: Serum samples obtained from SST frozen blood, Reagent kits that are ready to use... Data analysis used in this study is Spearman Rank.

RESULT

Cholinesterase (CHE) Level Examination Results

Based on the results of laboratory examination of blood samples from respondents by taking frozen blood samples which are processed into serum by centrifuging with a centrifuge at a speed of 4,100 rpm for 10 minutes and then conducting an in vitro test to quantitatively measure Cholinesterase levels in human serum, measurement using the Architec C8000 tool with the DGKC Butyrylthiocholine 37 ° C method to read the absorbance or levels obtained the following data can be seen in table 1:

Table 1.
Distribution of Respondents based on Cholinesterase (CHE) Levels

Cholinesterase (CHE)	Level Number of Respondents	%
5320 - 12920 U/L	20	100
< 5320 U/L	0	0
> 12920 U/L	0	0

Cholinesterase levels in question are the number of active cholinesterase enzymes in blood plasma and red blood cells that play a role in maintaining the balance of the nervous system this blood cholinesterase activity can be used as an indicator of organophosphate group pesticide poisoning in pesticide-using rice farmers who are suspected of being exposed to pesticides. According to Titaley & Souisa (2020) the normal value of Cholinesterase levels in the blood ranges from 5320 - 12920 U/L for the age of 40 years, if the level is below 5320 U/L indicates that the farmer is suffering from pesticide poisoning.

The results of the examination of Serum Glutamic Pyruvic Transaminase (SGPT) LevelsThe results of the examination of SGPT levels on farmers who use pesticides can be seen in table 2 as follows:

Table 2.
Distribution of Respondents based on Serum Glutamic Pyruvic Transaminase (SGPT) Levels

SGPT Level	Number of Respondents	%
< 50 U/L	19	95
> 50 U/L	1	5

Based on table 2 above, it shows that 19 respondents with a percentage of 95% have SGPT levels within normal limits with blood SGPT values less than 50 U/L and 1 respondent with a percentage of 5% has SGPT levels more than normal values.

DISCUSSION

Pesticides can enter the body through the skin (dermal), breathing (inhalation) or mouth (oral). Pesticides will be absorbed if they come into contact with the skin or eyes. This absorption will continue as long as the pesticide remains on the skin. Absorption rates are different for each part of the body. The transfer of pesticide residues from one part of the body to another will be very easy. If this happens it will increase the potential for poisoning. Residues can move from the hands to the sweaty forehead or genital area. Absorption rates are so high in these areas that they can be more dangerous than ingestion. Oral exposure can result in serious, serious injury or even death if swallowed accidentally, negligently or intentionally (Milala, 2020).The results of laboratory tests for the analysis of Cholinesterase (CHE) levels in 20 respondents are all still in the normal value range. This is in line with the results of research by Zahrox (2021) which found that most farmers have normal acetylcholinesterase levels, this is due to exposure to pesticides that enter the body of farmers has not reached hepatotoxic doses so that the inhibitory effect of organophosphate pesticides on acetylcholinesterase enzymes is mild, few free radicals are formed and do not cause damage to liver cells. The impact of pesticide use depends on the dose used. This is related to the frequency of pesticide use and the use of PPE. The frequency of pesticide use by farmers who were sampled in this study was low and all of them used PPE completely, so the negative impact caused by the use of pesticides was mild.

The results of the interview, obtained information that farmers use PPE in full. The most commonly used PPE are long-sleeved shirts and boots, other PPE such as masks, headgear and gloves, also obtained information that the dose used is in accordance with the recommendations on the packaging, and farmers usually ask for help from the head of the farmer group to mix the insecticide so that the dose is controlled in accordance with the recommendations on the packaging. The recommended dosage, if sprayed according to the requirements, will protect farmers from exposure to insecticides that could lead to health problems. Chemical pesticide hazard prevention behaviour is important to be applied by farmers so that it can reduce and even eliminate the risk of chemical pesticide poisoning. According to Maranata et al (2018), several factors that can affect the occurrence of pesticide poisoning are external factors (from outside the body) such as the amount of pesticide used, the type of pesticide, the dose of pesticide, the frequency of spraying, the working period of being a sprayer, the length of spraying, the use of personal protective equipment, how to handle pesticides, spraying time and actions towards wind direction and basic sanitation.

The results of the study also found that farmers who used pesticides did not experience an increase or could also be called normal. According to research by Widarti & Nurqaidah

(2018), it was found that the analysis of SGPT levels in farmers who used pesticides did not increase or could also be called normal. In farmers, SGPT levels are said to be normal because all chemicals in the form of nutrients and xenobiotics (eg pesticides) contained in the blood will be metabolised and biotransformed by the liver. The process of biotransformation of xenobiotics (eg pesticides) by the liver that takes place is good because it decreases and even disappears the levels in the blood that come out of the liver before reaching other organs. According to Putri's research (2020) in farmers SGPT levels are said to be normal because all chemicals in the form of nutrients and xenobiotics (eg pesticides) contained in the blood will be metabolised and biotransformed by the liver. The process of biotransformation of xenobiotics (eg pesticides) by the liver that takes place is good because it decreases and even disappears the levels in the blood that come out of the liver before reaching other organs.

The results of the study found that 1 respondent's CHE results were close to below the reference value, the results of this study are related to the level of risk of pesticide exposure with cholinesterase levels, based on the results of the questionnaire showed that respondents whose CHE results were below the reference value were due to respondents not wearing complete PPE, not wearing personal protective equipment when carrying out agricultural activities will increase pesticide exposure in this case can provide contact time between the skin of the body, with longer pesticides so that absorption by the skin will be more, supported again by the direction of spraying downwind which will provide more exposure to pesticides.
The results of the study found that 1 person experienced an increase in SGPT levels, in this case it was suspected that it was not due to pesticide exposure that caused an increase in the value of SGPT levels in respondents, based on the results of interviews with respondents who experienced an increase in SGPT levels had a habit of consuming alcohol in the form of arak and tuak, the habit of drinking alcohol since 4 years ago with the frequency of drinking alcohol 4-5 times a week with an average consumption of 1-2 glasses of alcohol (+ 200-400 cc). Duration of consumption, amount of alcohol consumption and average frequency of alcohol consumption can also increase SGPT levels, in studies that have been conducted show that these factors have an effect. According to Conreng (2017), alcohol consumption in the last 1 year can increase SGPT levels. In research by Ardiansyah (2018), stated that SGPT levels increased in the length of consumption > 5 years. Agustina's research (2018) stated that alcohol consumption 4-7 times a week and more than 200 cc in one consumption can increase SGPT levels.

Based on ethanol content, alcoholic beverages are divided into 3 groups, namely group A (1-5%) such as beer, group B (5-20%) wine, wine and tuak and group C (20-55%) whiskey, vodka, mansonhouse, johnywalker, kemput and arak (Ministry of Health, 2019). All types of alcoholic beverages can be detrimental to health if consumed in excessive amounts. And it is explained that consuming alcoholic beverages with the type of tuak which is included in group B and arak which is included in group C can cause chronic liver diseases such as liver cirrhosis which can increase Serum Glutamic Pyruvic Transaminase (SGPT) levels besides consuming alcohol with a level of 40% more than 1 litre is at risk of Hepatoksik (Agustina, 2018). This is in accordance with the results of Artini's research (2021) that increasing SGPT levels can be influenced by several factors such as smoking and drinking habits containing alcohol. SGPT examination is a parameter of liver function to determine changes in the activity of tranminase enzymes in liver parenchymal cells. Normally, this enzyme is in the cell, if the activity is disturbed, this enzyme will increase in blood cells.

The results of the Pearson Product Moment parametric test show that there is a correlation between Cholinesterase levels and SGPT levels in the blood of rice farmers who use

pesticides. The results of this study are in line with the research of Wulandari and Santosa (2020) which shows that pesticide exposure can increase the levels of SGOT and SGPT enzymes. In accordance with research (Widarti, & Nurqaidah, 2019) the increase in SGOT and SGPT levels occurs due to an increase in the formation of malondialdehyde (MDA). MDA is formed from hepatic lipid peroxidation which is toxic, mutagenic, and can inactivate enzymes through binding to lysine residues. Lipid peroxidation in biological membranes can be initiated by exposure to chemicals, radiation, and pesticides that can trigger the formation of MDA.

The process of damage to the liver as an organ that detoxifies chemicals such as paraquat, can occur due to direct toxicity or through the conversion of chemicals contained in paraquat herbicides into active toxins by the liver so that it can cause several abnormalities in the liver such as swelling of hepatocytes, congestion of liver sinusoids, fibrosis, cirrhosis, and necrosis (Putri, 2020). If there is an abnormality in the liver, the only clue to detect abnormalities in liver function is to perform an enzyme test. SGPT is an enzyme whose presence and levels in the blood are used as a marker for impaired liver function. Damage to the liver will cause the liver enzymes to escape into the bloodstream so that their levels in the blood increase and indicate impaired liver function. SGPT activity in the liver can be detected even in very small amounts, thus, SGPT has a relatively high specificity for liver damage (Widarti, & Nurqaidah, 2019). SGPT is the main and most commonly found enzyme in liver cells and is effective in diagnosing hepatocellular destruction. It is also found in small amounts in heart muscle, kidney, and skeletal muscle. Serum SGPT levels can be higher than levels of another group of transferases (transaminases), aspartate aminotransferase (AST/SGOT), for cases of acute hepatitis in drug and chemical-induced liver damage, with serum levels reaching 200-400 uL. SGPT is used to distinguish between causes of liver damage and hemolytic jaundice. SGPT levels in serum jaundice of hepatic origin are found to be higher than 300 units, those of non-liver origin are found to be <300 units. Serum SGPT levels are usually elevated before icteric appearance. SGPT levels in adults are normal, which is <50 U/L (Kee, 2008). SGPT is found in the cytosol of hepatocytes. SGPT activity in the liver is about 3000 times the serum activity. In cases of hepatocellular injury or chemokinesis, the release of SGPT from damaged liver cells will increase the SGPT activity measured in serum. Since serum SGPT levels are elevated in disease states that can cause hepatocellular injury, serum SGPT levels are effective for identifying ongoing liver disease processes. It is likely to be significantly elevated in liver disease, especially if elevated SGPT is associated with symptoms such as fatigue, anorexia or pruritus (Kim et al., 2008).

According to the researcher, Cholinesterase levels are related to SGPT levels in the blood of rice farmers who use pesticides where most of the respondents' Cholinesterase levels are all normal and SGPT levels are mostly normal, it can be caused by the use of PPE by respondents when spraying pesticides will reduce the risk of exposure to pesticides. The use of incomplete PPE can cause pesticides to enter the body more easily, such as absorbing through the skin and even inhaled through the respiratory tract because parts are not protected by tools that can prevent the entry of pesticides into the body. Conditions in the field found that some workers feel uncomfortable when using PPE on the grounds that it can interfere with the process of working. This according to the results of this study in line with research conducted by Saragih (2019) found that there is a strong relationship between the use of personal protective equipment and cholinesterase levels in spraying workers. Personal protective equipment (PPE) is equipment that must be used when working according to work hazards and risks to maintain the safety of the workers themselves and those around them. Based on the Regulation of the Minister of Labour and Transmigration of the Republic of

Indonesia No PER.08/MEN/VII/2010 on Personal Protective Equipment includes protective equipment for the head, eyes, ears, breathing, hands and feet. The use of PPE by pesticide applicators or sprayers will reduce the risk of pesticide exposure. Based on Permenkes No. 258/MENKES/PER/III/1992 on Requirements for the Use of Pesticides, the minimum protective equipment that must be used is based on the type of work and classification of pesticides.

CONCLUSION

Cholinesterase levels of pesticide-using rice farmers in Banjar Manikan, Guwang Village, Gianyar Bali as many as 20 respondents or 100% of respondents have cholinesterase levels in the normal value range of 320 - 12,920 U/L and SGPT enzyme levels as many as 19 or 95% of respondents have SGPT levels in the normal value range, while as many as 1 respondent with a percentage of 5% exceeds the normal value.

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