

OVERVIEW OF EXAMINATION RESULTS OF SERUM GLUTAMIC OXALOACETIC TRANSAMINASE (SGOT) AND SERUM GLUTAMIC PYRUVIC TRANSAMINASE (SGPT) LEVELS ON FARMERS AT PADENGO VILLAGE SUB-DISTRICT OF DENGILLO DISTRICT OF POHUWATO

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ABSTRACT

This research aimed to give an overview about the examination results of Serum Glutamic Oxaloacetic Transaminase (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT) levels of farmers at Padengo Village, sub-district of Dengilo district Pohuwato.

This research used a quantitative approach with descriptive analysis. The type of data used was primary data in the form of the results of the research and the secondary data were in the form of data from literature, books and documents. The sampling used simple random sampling technique with a total sample of 29 farmers.

The results showed that from the examination of SGOT and SGPT levels, the percentage of normal levels was 69.0% while the percentage of abnormal levels was 31.0%. Based on the length of work of the rice farmers in Padengo Village, for the working period of more than 10 years, the percentage of abnormal SGOT and SGPT levels was 24.1% while the percentage of normal SGOT and SGPT levels was 75.8%; for the working period of less than 5 years, the percentage of abnormal SGOT and SGPT levels was 6.8% but no normal SGOT and SGPT levels were found.

Keywords: SGOT, SGPT, farmers

INTRODUCTION

Economic sectors in Indonesia depend on agricultural production in this country. Indonesia has a tropical climate with fertile soil and is suitable for planting various types of plants.

Based on data from the Central Statistics Agency, in 2020, the percentage of workers in the agricultural sector in the Province of Aceh was 85.99%; Sumatra Province was 80.76%; DKI Jakarta was 48.19%; East Java was 92.52%; Yogyakarta was 93.80%, Banten was 91.60%, Bali was 92.82%, NTB was 98.24%, NTT was 98.23%, North Kalimantan was 76.77%, South Sulawesi was 91, 73%, Maluku was 94.70%, Papua

was 98.97%, and Gorontalo was 88.39%. Based on data from the Department of Agriculture, the number of farmers in Padengo Village is 761 farmers [2].

According to the Great Dictionary of the Indonesian Language (KBBI), the definition of a rice farmer is someone who works with farming or individuals who are busy with agrarian efforts to develop the area with the aim of maintaining or developing crops such as corn, rice, natural flowers, and vegetables hoping that the production results can be used by themselves or traded to others [11].

Agricultural production in Indonesia needs to be increased as much as possible

to achieve food security, even though there are challenges related to the size of the agricultural area. The use of pesticides are one of the efforts taken to overcome the dangers of attacks on agricultural products. Pesticides are organic compounds that can inhibit or kill plant diseases and pests [18].

Based on the purpose and way of working, pesticides can be grouped into several categories [3] including:

- a. Insect Pheromones (insect repellent)
- b. Herbicides (plant pests/weeds)
- c. Fungicides (suppress parasite development)
- d. Bactericides (microbe exterminator)
- e. Nematicide (worm control)
- f. Acaricides/miticides (insect and flea repellent)
- g. Rodenticides (rat repellents)
- h. Molluscicides.

The steps for the use of pesticides include preparation by means of procurement/purchase of pesticides, selecting the type of pesticide that is suitable for the pest/insect to be controlled, selecting the form and formulation of the pesticide as needed, and paying close attention to and understanding the images listed on the packaging and instructions [4].

Pesticide kit can be Swing Fog, Knapsack, etc. The tools needed for mixing pesticides are measuring cups, funnels, and buckets. Personal protective equipment consists of gloves, masks, eye protection, boots, and work clothes. Mixing pesticides should not be done haphazardly, but must follow existing regulations, namely dilution must be carried out according to the recommended dose on the packaging by paying attention to label instructions, mixing time, a place with good air circulation, wearing appropriate protective equipment, and pesticides must be placed in a suitable place that is safe from the reach of

children. If contamination occurs, the affected body parts must be washed immediately. The way to apply pesticides is to choose the volume of the sprayer that matches the area to be sprayed, ensure the equipment is in good condition, and spray at the best time to spray, namely in the morning at 08.00 – 11.00 AM or in the afternoon at 15.00 – 18.00 PM. Farmers are forbidden to spray when the wind is strong, spray against the direction of the wind, eat/drink or smoke while spraying, and wipe the eyes and mouth with hands when spraying. The use of safety clothes is highly recommended [4].

The steps that must be taken after spraying are to immediately bury the remaining pesticide mixture, wash application equipment, return unused pesticides to a safe place, destroy empty pesticide containers, and take off and replace all clothes used during the spraying with clean clothes [4].

Most farmers use pesticides by spraying but improper implementation puts the farmers at risk of being exposed to chemical pesticide substances. Failure to use PPE according to regulations while spraying can also result in health problems, including impaired liver function [5].

The spraying technique that is contrary to the wind direction can cause the farmers to accidentally inhale pesticides which will then enter the body through nose and mouth [6].

All types of pesticides have the potential to be harmful to health. There are two types of poisoning that can be caused by pesticides, namely direct (acute) poisoning and long-term (chronic) poisoning. Acute poisoning occurs when the effects of pesticide poisoning are felt immediately. In acute poisoning, large amounts of poison enter the body and react immediately in a short time (in seconds, minutes, hours or in a day) so

that the effects can be felt more quickly. Some indications include migraine, stomach cramps, vomiting, loose appetite, blurry eyes, weakness, blurred vision, difficulty breathing, nausea, and muscle pain [12].

Chronic poisoning occurs when poisoning has been present for a long time so that the damage develops with lasting effects. The effects that occur when a person experiences chronic poisoning are as follows [12]:

1. Nerves

Disorders of the brain and nerves are the most common infections caused by prolonged use of pesticides. Disturbances can include memory problems, difficulty concentrating, loss of movement, and even loss of consciousness.

2. Liver

The liver is an organ that functions to kill toxic synthetic compounds. Exposure to pesticides for a long time reduces the performance of the liver which can cause damage to the organ. This can make a person face the adverse effects of hepatitis.

3. Stomach

Vomiting, abdominal pain, and diarrhea are some of the general symptoms that occur due to pesticide use. Direct contact with pesticides for a long time can cause eating problems. People who accidentally ingest pesticides have adverse effects on the stomach and the body as a whole. Pesticides that enter the body through the digestive tract can cause damage to organs in the abdomen.

4. Immune System

Some types of pesticides are known to attack the immune system in a more dangerous way. Some types of pesticides can weaken the ability of the body to resist and fight infection making the body more susceptible to infection and if the infection has

occurred earlier, the infection will become more severe and more difficult to cure.

5. Hormone System

Hormones are chemicals produced by organs such as the brain, thyroid, parathyroid, kidneys, adrenals, testes, and ovaries to control important body functions. Some pesticides can affect reproductive hormones, causing a decrease in sperm production in men or abnormal egg growth in women. Some types of pesticides can cause enlargement of the thyroid which can eventually progress to thyroid cancer.

The liver is located in the upper abdomen fused in the biliary duct and gallbladder. The liver is the largest glandular organ in the human body, weighing about 1200-1500 grams. The liver receives the results of systemic blood circulation through the hepatic artery and then accommodates it in the bloodstream from the portal system which contains nutrients for intestinal absorption. When observed microscopically, the liver is composed of lobules with a large number of similar shapes consisting of hepatocytes, sinusoidal channels surrounded by vascular endothelium, and Kupffer cells belonging to the reticuloendothelial system [14].

The liver functions to neutralize toxic chemicals that enter the body by carrying out a detoxification process where these toxic compounds will be converted into other compounds that are no longer toxic to the body. However, exposure to pesticides in high frequency will cause damage to the liver such as hepatitis, cirrhosis, or even cancer [14].

The majority of rice farmers use pesticides to eliminate pests, weeds, and plant diseases, including rice farmers in Padengo Village, Dengilo sub-district, Pohuwato. Pesticides commonly used are herbicides that can eradicate nuisance plants. The types of herbicides that are

often used in Padengo Village are Rambo and Naloxone. Spraying time is usually carried out for 5-6 hours/day in the morning starting at 06.00-11.00 AM. This causes rice farmers to often come into direct contact with pesticides which cause poisoning.

In terms of age, the risk of pesticide poisoning in both young and old age is almost the same, even though at a young age the risk is smaller. In terms of age and working period, this is possible because the longer a farmer uses pesticides, the more likely they are to be exposed to pesticides. Increasing age also affects metabolic ability. As people age, their metabolic ability decreases, especially if at the same time they are exposed to pesticides. Age affects the performance of immune system in overcoming the level of toxicity of a substance. The older a person is, the less effective his immune system is. Based on a research, farmers aged 40 years (old age) had a 1.99 times chance of experiencing poisoning compared to farmers aged <40 years (young age) [19].

According to the Data and Information Center of the Ministry of Health of Indonesia, the age is divided into two, namely productive working age (aged 15-64 years) and non-productive working age (over 64 years old). A person with poor nutritional status will result in decreased body resistance and increased sensitivity to other microorganisms [19].

The length of work as a farmer is divided into two categories, the period group of less than 5 years is considered as a new working period and the period group of more than 5 years is considered as a long working period because during this period chronic poisoning usually occurs. The longer the working period of a farmer, the higher the frequency of contact with pesticides which then has an impact on the lower blood cholinesterase levels. The frequency of spraying should

still be carried out in accordance with the regulation so that the poisoning due to pesticides can be minimized. The recommended spraying frequency is a maximum of 2 times a week. Most of the farmers do the spraying independently (especially those with small plots of land) using their own sprayer so that they have the flexibility to do the spraying. Exposure to pesticides on the body with frequent frequency and with short intervals causes pesticide residues in the human body to be higher, especially if accompanied by wrong spraying actions against the wind direction [19].

Working for long time with pesticides affects liver function. The length of work shows how long the farmer has been spraying so that the more direct contact with the pesticide occurs, the more pesticide chemicals enter the body. The accumulation of pesticides in large quantities affects the performance of body organs including the liver because these toxic substances damage the plasma layer so that the chemicals in the cytosol will enter the bloodstream due to the contrast in the porous cell film so that the level of protein aminotransferases in the blood will increase [19].

The best time to spray is before 11.00 AM and in the afternoon at 03.00-06.00 PM and outside this time range, spraying pesticides is harmful. Bathing during the day with high temperatures will also increase the risk of possible damage to the body's organs because high temperatures will make the metabolic system of the body increase and the absorption of pesticides into the body becomes greater. [19].

The correct spraying is to follow the wind direction so the sprayer must change the spraying position when the wind direction changes. Based on the guidelines from the World Health Organization (WHO), the sprayer must work with wind

speeds not exceeding 4–12 km/hour. Spraying pesticides that are not in accordance with the direction of the wind will cause soil pollution because pesticide substances are carried by the wind. If these toxic substances pollute the environment it can cause various infections indirectly to humans that can lead to malignancy [19].

Pesticide pollution directly or indirectly has an impact on humans which can be in the form of symptoms that can be felt by people. Unfortunately, people often ignore the symptoms that arise due to exposure to these pesticides. The community does not immediately go to the hospital when symptoms appear causing cases of pesticide poisoning not to be detected quickly so that the chronic effects cannot be avoided [5].

Rice farmers are faced with direct or indirect exposure to pesticides. Pesticide exposure can occur right at the time of spraying. Exposure to pesticides directly or indirectly can come from drinking water, air, dust, and food contaminated with pesticides. Chemicals contained in pesticides will have a dangerous impact on farmers who do not wear PPE when spraying. This results in health problems in the human body, one of which is increased liver function where the levels of Serum Glutamic Oxaloacetic Transaminase and Serum Glutamic Pyruvic Transaminase in the blood increase. When rice farmers are exposed to hazardous substances such as pesticides that last for a long period of time, it can cause persistent or severe liver damage. One of the examinations in order to check liver capacity is the assessment of SGOT and SGPT.

Serum Glutamic Pyruvic Transaminase (SGPT) or Alanine aminotransferase (ALT) is an enzyme that is found mostly in liver cells as well as in heart muscle, kidney, and skeletal muscle in small amounts. It can be used to

diagnose hepatocellular damage. A significant increase in SGPT indicates a medical problem in the organs such as viral hepatitis, congestive heart failure, liver damage, bile duct problems, infectious mononucleosis or myopathy. Therefore, SGPT is generally used for screening liver damage. SGPT can also increase due to strenuous physical exercise.

Conditions that increase SGPT levels are [16]:

1. Causing high effects: acute (viral) hepatitis and hepatic necrosis (drug or chemical toxicity).
2. Causing mild or moderate effects: cirrhosis, liver cancer, congestive heart failure and acute alcohol intoxication.
3. Effects of drugs: antibiotics, narcotics, antihypertensives, salicylates, rifampin, oral contraceptives, and heparin.

SGOT or Aspartate aminotransferase (AST) is an enzyme that is commonly found in heart and liver muscle, and also in skeletal muscle, kidney, and pancreas in sufficient amounts. Low concentrations are found in the blood but when cellular injury occurs, large amounts of SGOT are released into the circulation [16]:

1. Liver
2. Pancreas
3. Heart
4. Spleen
5. Skeletal muscles
6. Brain
7. Kidney
8. Lungs

SGOT is mostly bound in organelles and only a small part is found in the cytoplasm, but on the contrary, SGPT is mostly bound in the cytoplasm. If the damage to liver cells mostly affects the liver cell membranes, the increase in SGPT is more prominent and vice versa, if the damage to liver cells affects the organelles it will cause a more prominent increase in SGOT.

An increase in SGOT found in [7]:

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- a. Myocardial necrosis (acute myocardial infarction)
- b. Cirrhosis
- c. Heart cancer
- d. Chronic hepatitis
- e. Heart congestion
- f. Hemolytic anemia
- g. Acute pancreatitis
- h. Acute kidney disease

A decrease in SGOT found in:

- a. Uncontrolled diabetes
- b. Beriberi (thiamine deficiency).

The pesticides generally enter the body through the skin, eyes, or inhalation so that it can affect organs such as the liver because the liver functions as a center for the digestion of protein, fat, sugar, as well as a container for detoxification of toxic substances in the body.

Based on research conducted by several experts, the factors that affect serum glutamic pyruvic transaminase (SGPT) levels are [7]:

- a. Lack of rest
- b. Fatigue
- c. Consumption of drugs

Consumption of certain drugs can increase SGPT levels including:

- a. Isoniazid is a type of antibiotic drug for tuberculosis.
- b. Methyldopa, is a type of antihypertensive drug.
- c. Phenytoin and valproic acid, are types of drugs commonly used as anti-epileptic drugs or epilepsy.
- d. Paracetamol.

Pesticide chemicals that continuously enter the liver makes it hard to be neutralized because it will be weaken the liver function. The polyunsaturated fats (PUFA) that has important role to cells growth is also affected so that the damage to the liver parenchyma or porous liver cell layers occurs resulting in aminotransferase compounds that are normally found in cells (cytoplasm) into

the blood. This increases SGOT and SGPT levels as an indication of liver damage [21].

The use of different organophosphates (7 species) and other organochlorines (14 species) leads to chronic persistent symptoms because the exposure increases the levels of SGOT and SGPT, as well as the phosphatase antacids. The combination of these various types of pesticides produces a greater hepatotoxic effect [21].

Based on the explanation, the researchers were interested in conducting a study entitled "Overview of Examination Results of Serum Glutamic Oxaloacetic Transaminase (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT) Levels on Farmers at Padengo Village Sub-District of Dengilo District of Pohuwato".

RESEARCH METHOD

The research method used a quantitative approach because the research emphasizes information in the form of numbers that can represent the variables.

Descriptive analysis is used in this study to analyze the data that has been collected by describing it as it is without drawing conclusions. The research was conducted in Padengo Village, Sub-district of Dengilo, district of Pohuwato for a period of one month starting from June to July in 2021.

The types of data collected as important information include information of respondents obtained from interviews and surveys as well as examination results in the form of data on the number of farmers living in the village.

The population of farmers in this village was 761 farmers. The sample size was calculated using the following formula [9].

$$n = \frac{N Z^2_{1-\alpha/2} P (1 - P)}{(N - 1) d^2 + Z^2_{1-\alpha/2} P (1 - P)}$$

The sampling using the Simple Random Sampling technique which is considered simple because the sampling of the population is done randomly.

The data were presented in tabular form and reported in percentages using the formula as suggested by Lemeshow [11].

RESULTS

The results of the examination of serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic (SGPT) levels in farmers in Padengo Village, sub-district of Dengilo, district of Pohuwato for 2 months in the Laboratory of Bumi Panua Regional General Hospital in Pohuwato with a total of 29 blood samples are presented in tabular form along with the following narrative.

Table 1. The examination results based on the use of PPE

PPE Use	Frequency	%
Yes	2	6.9
No	27	93.1
Total	29	100

(Source: Primary Data, 2021)

Table 1 shows that the results of the SGOT and SGPT levels of farmers who used PPE when spraying have a percentage of 6.9% while on farmers that were spraying without PPE have a percentage 93.1%.

Table 2. Examination results based on duration of using pesticides

Duration	Frequency	%
>1 Year	2	6.9
2-5 Years	5	17.2
>5 Years	22	75.9

Total	29	100
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(Source: Primary Data, 2021)

Table 2 shows that the percentage of SGOT and SGPT levels of respondents who used pesticides for more than 1 year are 6.9%; the levels of respondents used pesticides for 2-5 years are 17.2%; the levels of respondents use pesticides for more than 5 years are 75.9%.

DISCUSSION

Serum glutamic oxaloacetic transaminase (SGOT) is in the heart and liver muscles. When there is a disturbance in this organ, the liver cells will secrete the SGPT protein which will then enter the bloodstream [9].

The sample in this study were rice farmers who had direct contact with pesticides. Based on the results of the examination, as many as 31% of the samples had abnormal levels of SGOT or had increased levels while as many as 69.0% of SGOT levels were normal. These results indicate that most of the respondents have normal levels of SGOT. This result is in line with previous research [19] where farmers with normal SGOT levels were more than farmers with increased SGOT levels. Farmers with normal levels of SGOT as many as 20 people (66.67%) while farmers who experienced increased levels of SGOT as many as 10 people (33.33%).

SGPT (*Serum Glutamic Pyruvic Transaminase*) found in liver cells. The level of SGPT in the liver can describe the state of the organ. When the liver cells are damaged the SGPT protein will be released from the liver cells into the blood vessels. SGPT levels will increase, especially when there is damage to the liver [14]. Based on the results of the examination, as many as 31% of the samples had abnormal levels of SGPT or had increased levels while as many as 69.0% of SGPT levels were normal. It

indicates that the SGPT levels did not increase. This result is in line with previous research [19] where farmers with normal SGPT levels were farmers with normal levels of SGPT as many as 23 people (76.67%) while farmers who experienced increased levels of SGPT as many as 7 people (23.33%).

From the results of the examination based on length of work, the percentage of rice farmers with a working period of > 10 years with abnormal SGOT and SGPT levels was 24.1% and normal SGOT and SGPT levels was 75.9%. The percentage of rice farmers with a working period of < 5 years with abnormal SGOT and SGPT levels was 6.8% and there were no rice farmers with normal SGOT and SGPT levels. This result is in line with previous research which showed that rice farmers were identified with the use of harmful pesticides because in this review farmers who had a long working period of 85.7% experienced a decrease in liver capacity.

Length of work is one of the factors that affect liver function because the longer farmers work using pesticides, the more chemicals that can accumulate in the body, which in large quantities will harm the body.

From the results of SGOT and SGPT examinations based on sex, male respondents have a percentage of 91.1%, while female respondents have a percentage of 6.9%. This research is in line with previous research which shows that the number of male farmers was 55% [17]. Most of the respondents filling out the survey form were men because it requires this work requiring exercise mainly because pesticide spraying requires proactive duties and individual behavior so that spraying pesticides is considered a male job [1].

Based on age, the results of the examination of abnormal SGOT levels in the age range of 25-35 years were 4

samples (13.8%) and normal SGOT levels were 7 samples (24.1%); in the age range of 36-45 years as many as 4 samples had abnormal levels of SGOT (13.8%) and as many as 11 samples had normal levels (37.9%); in the age range of 46-51 years, 1 sample had abnormal SGOT level (3.4%) and 2 samples (6.9%) had normal SGOT levels. Abnormal SGPT levels in the age range of 25-35 years were 4 samples (13.8%) and normal SGPT levels were 7 samples (24.1%); in the age range of 36-45 years, 4 samples had abnormal SGPT levels (13.8%) and 11 samples had normal SGPT levels (37.9%); in the age range of 46-51 years, 1 sample had abnormal SGPT levels (3.4%) and 2 samples (6.9%) had normal SGPT levels. The normal age of rice farmers is at the age of 42 years where the youngest age is 24 years and the oldest is 62 years old [20]. Age affects how high the level of pesticide poisoning experienced by farmers. From age can be calculated the risk of toxicity in a person's body. Even though they are relatively young, if they do not work with pesticides according to the procedures that have been determined, especially in the long term, it will still cause health problems for the farmers.

From Table 1 it can be seen that from the examination of SGOT and SGPT levels based on the use of personal protective equipment, as many as 2 rice farmers (6.9%) used PPE and as many as 27 rice farmers did not use PPE. Farmers often neglect the use of complete PPE so they are very likely to be exposed to pesticides during spraying. This is in line with research [19] which showed that only 1 farmer (2.3%) used complete PPE and 42 farmers (97.7%) did not use complete PPE. The use of complete personal protective equipment can prevent and reduce the pesticide exposure because the possibility of direct contact

with pesticides can be reduced so that the body is protected from the dangers of pesticide poisoning entering the body through the respiratory tract and skin [14].

Wind direction is very influential on the negative impact of spraying. Spraying against the wind will make the risk of pesticide exposure higher and will damage to plants that are splashed. Spraying that does not consider the wind direction will cause harm not only to farmers, but also to the environment because these synthetic compounds collected from the dynamic elements of pesticides will cause rural soil pollution [21].

Based on Table 2, from the results of the SGOT and SGPT levels examination using a sample of rice farmers seen by the duration of pesticide use, it was found that > 1 year as many as 2 rice farmers (6.9%), 2-5 years as many as 5 rice farmers (17.2%) and > 5 years found as many as 22 rice farmers (75.9%). A large area of land is one of the variables that can affect the amount of pesticide exposure that poses a hazard to health.

Based on the rules on the use of pesticides, farmers are not allowed to spray pesticides continuously for more than four hours per day because the recurrence and duration of spraying will cause the tendency of pesticides to harm the surrounding area to be higher [7].

CONCLUSION

Based on the results of research on the examination of levels of SGOT (Serum Glutamic Oxaloacetic Transaminase) and SGPT (Serum Glutamic Pyruvic Transaminase) from 29 farmers in Padengo Village, sub-district of Dengilo, district of Pohuwato, it can be concluded that the percentage of SGOT levels and normal SGPT levels is 69.0% while the percentage of abnormal levels of SGOT and SGPT levels of (31.0%).

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