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THE NURSING ASSESSMENT OF WORK HISTORY IN AGRICULTURAL AREAS WITH LIVER AND KIDNEY FUNCTIONS IN FARMERS

Rizeki Dwi Fibriansari[1]*, Arista Maisyaroh[2], Eko Prasetya Widianto[3]
[1,2,3]Nursing Diploma, Faculty of Nursing, University of Jember, Indonesia

***Corresponding Author:**
Rizeki Dwi Fibriansari
Nursing Diploma, Faculty of Nursing, University of Jember
rizekifibriansari@unej.ac.id

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ABSTRACT

The demand to increase the productivity of agricultural products greatly drives the use of pesticides in agricultural areas. Uncontrolled use of pesticides by farmers and non-compliance with the use of personal protective equipment leads to long-term poisoning that can affect liver and kidney function. However, the relationship between them is poor research. This study aimed to find the relationship between the history of work in agricultural areas with liver and kidney function in farmers. The design of this study was cross-sectional. Respondents for this survey were 36 persons, drawn by purposive sampling. For data, collection questionnaires and interviews are of work history in the agricultural area and observation of laboratory data in the medical records of patients. Data analysis was bivariate analysis with linear regression with p-value <0.05. The normality test with the Kolmogorov-Smirnov test shows all variables are abnormal distributions (p>0.05). In the analysis with linear regression methods there is a correlation between many pesticides with the value of SGOT (p=0.001) and SGPT (p=0.034), use of PPE with a level of creatinine (p=0.019) and SGOT (p=0.008). Urea has a fairly weak relationship with a work history in the agricultural areas (R=0.157), creatinine has a moderate relationship (R=0.471), SGOT has a weak relationship (R=0.362), and SGPT has a weak relationship (R=0.320). Farmers' local knowledge and wisdom can assist in recognizing and early handling threats due to hazardous materials in the agricultural environment. Therefore, it is necessary to make efforts to minimize the risk of exposure to pesticides, including through the use of personal protective equipment.

Keywords:
Farmers, Kidney, Liver, Work

BACKGROUND

The agricultural sector is one of the most important sectors globally, including in developing countries. In Indonesia, the agricultural sector is generally the main job recorded with 50% of the Indonesian population working in the agricultural sector (Maisyaroh et al., 2019). Health problems faced by farmers can't be separated from the use of pesticides in the eradication of pests that can significantly affect health. Pesticides are chemicals intentionally introduced into the environment to kill or control insects, rodents, weeds, or fungal pests that affect crop production (Zahrox et al., 2021). Pesticides are widely

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used by farmers to increase agricultural productivity, an activity critical to human well-being and economic growth in developing countries. Agriculture accounts for most of the gross domestic product and employs most of the labor force in rural areas (Manfo et al., 2020).

The World Health Organization (WHO) estimates that between one and five million cases of pesticide poisoning occur each year among farm workers (80%), resulting in 220,000 deaths in developing countries. In Indonesia, pesticide use poses a serious threat to farmers, especially in the health sector. Indonesia reports a record 12,000 deaths each year due to pesticide use (Pamungkas, 2016). Improper use and handling of pesticides and lack of knowledge about their hazards are the root causes of pesticide poisoning. In addition, the use of Personal Protective Equipment (PPE) is another factor in poisoning cases, and direct exposure to hazardous or other materials on agricultural land farmers (Widianto et al., 2020).

The impact of pesticide exposure on health depends on the type and substance of the pesticide, in general pesticides are grouped based on their active ingredients (chemical classification) and the mechanism of work in which carbamate, organochlorine, organophosphate, and pyrethroid groups (Perry, 2016). Most farmers are unaware of the risk of chronic poisoning from exposure to pesticides for months to years. Pesticide use often does not comply with the recommended rules when treating pest attacks. Conditions like this are further exacerbated by the indifference of farmers about the dangers of pesticides that can poison farmers, not only but even their families and the environment (Maisyaroh, 2019). SGPT and SGOT are enzymes whose presence and levels in the blood are used as markers of impaired liver function. This enzyme normally resides in liver cells. Damage to the liver will cause these liver enzymes to be released into the bloodstream so that their levels in the blood increase and indicate liver dysfunction (Kapeleka et al., 2016). Pesticide exposure occurs due to contact between pesticides and farmers who use pesticides. Exposure to pesticides for a long time can cause the accumulation of pesticides in the liver which cannot be broken down or excreted resulting in clinical symptoms including nausea, dizziness, headache, anxiety, hypersalivation, irritation of the respiratory tract and skin, muscle weakness, fatigue, and abdominal pain. Accumulation of pesticides in the liver can trigger an increase in the number of free radicals, causing impaired liver function (Fibriansari et al., 2021).

Toxic entry into the body can be done in several ways including through the dermal (skin), inhalation (breathing), and ingestion (through food and drink). The reality in the field is that farmers are not aware of the toxic power of pesticides, so they do not pay attention to safety when storing and using them (Jamal et al., 2015). Farmers, as workers who are used to direct contamination with pesticides, have a higher risk. The risk of using pesticides directly can occur not only when spraying, but can also occur during the preparation process until after the spraying. The lack of awareness of farmers to use PPE when spraying is a risk factor for poisoning (Bondori et al., 2018). Farmers can experience dizziness, skin irritation, watery eyes, fainting, and even cause death. This can be caused by a lack of awareness of workplace safety and awareness of the dangers of poison from the pesticides used (Widianto et al., 2022). This study aimed to find the relationship between the history of work in agricultural areas with liver and kidney function in farmers.

METHODS

The cross-sectional study method was chosen as an approach because this study provides an association relationship between the history of work in agricultural areas with liver and kidney function in farmers. Sampling techniques in this study used purposive sampling. The response was selected from all CKD patients at Jatiroto Hospital for the period September - October 2021 who met the inclusion criteria, used by patients who have a history of employment as farmers or who are closely related to agricultural areas. There were 36 selected respondents. Exclusion criteria are were patients who have laboratory results of liver and kidney function within the normal range.

Data collection for a certain period by cross-sectional survey method by questionnaire, interviews, and observation of the patient's medical record status. The questionnaire and interviews composed of 5 items of work history in the agricultural areas there is the length of work, length of work per day, number of pesticides, use of PPE, and pesticide exposure per week. Observation of the patient's medical record status about laboratory results of liver function (SGOT and SGPT) and kidney (urea and creatinine). The data analysis used in this study was bivariate analysis with linear regression with $p<0.05$. The normality test with the Kolmogorov-Smirnov test shows all variables are abnormal distributions ($p>0.05$). This research has been submitted to the research ethics

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committee of the Faculty of Nursing, University of Jember Number 158/UN25.1.14/KEPK/2021.

RESULTS

Table 1 shows that of the 36 respondents, 24 (67%) were female. Nearly half of the respondents were over the age of 55, 16 (44%). The education level of the farmers is almost uneducated and there are 14 farmers (38,9%). More than half of the respondents are farm laborers 20 people (56%).

Table 2 shows that most of the respondents have a length of work of more than 10 years was 93,9%. Length of work per day more than 8 hours per day was 91,2 %. Using pesticide amounts mixed or more than one type of pesticide was 58,4 %. almost whole responded not completely not using PPE was 97,2 %. whole respondents or 100% more than 2 times pesticide exposure per week.

Table 3 shows that most of the respondents have abnormal results for urea and creatinine 81%. The result of an abnormal SGOT was 74% and an abnormal SGPT was 52%.

Table 4 shows the results of the analysis with linear regression methods there is a correlation between the number of pesticides with an increase in the value of SGOT (p=0.001) and SGPT (p=0.034). Results can be concluded there is a positive relationship between the number of pesticides used against impaired liver function. And there is a relationship use of PPE and to increase in the level of creatinine (p=0.019) and SGOT (p=0.008). From the above results can be concluded there is a positive relationship between the use of PPE with impaired liver and kidney function.

Urea has a fairly weak relationship with a work history in agricultural areas (R=0.157), meaning that the more pesticides used, the higher the level of urea in the blood. Creatinine has a moderate relationship with a work history in agricultural areas (R=0.471), meaning that the more you use PPE, the higher the blood creatinine level. SGOT has a weak relation-

Table 1. Distribution of Respondent Characteristics

Category		n	%
Gender:	Male	12	33
	Female	24	67
Age (year):	17-35	7	20
	35-55	13	36
	>55	16	44
Latest education:	Uneducated	14	38,9
	Elementary School	5	13,9
	Junior High School	3	8,3
	Senior High School	11	30,6
	Others	3	8,3
Profession:	Farmer	6	16,7
	Farm labor	20	56
	Farmer's wife	4	11
	Farm factory worker	4	11

Table 2. Work History in the Agricultural Areas

Category		n	%
Length of work:	3-10 years	2	6,1
	>10 years	34	93,9
Length of work per day:	1-8 hours	3	8,8
	>8 hours	33	91,2
Number of pesticides:	>1 (mixed)	21	58,4
	1 type	15	41,6
Use of PPE:	Use and complete	1	2,8
	Not complete/not use	35	97,2
Pesticide exposure per week:	1-2 times	0	0
	>2 times	36	100

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Table 3. Laboratory Test Results

Category			n	%
Liver function:	SGOT	Normal	9	26
		Abnormal	27	74
	SGPT	Normal	17	48
		Abnormal	19	52
Kidney function:	Urea	Normal	7	19
		Abnormal	29	81
	Creatinine	Normal	7	19
		Abnormal	29	81

Table 4. The Statistical Test Results

Variable	Urea	Creatinine	SGOT	SGPT
Length of work	0.549	0.116	0.337	0.282
Length of work per day	0.458	0.291	0.371	0.341
Number of pesticides	0.245	0.371	0.001	0.034
Use of PPE	0.268	0.019	0.018	0.350
Pesticide exposure per week	0.268	0.428	0.110	0.097
R	0.157	0.471	0.362	.320

ship with a work history in agricultural areas (R=0.362), meaning that the more often you are exposed to pesticides, the higher the level of SGOT in your blood. SGPT has a weak relationship with a work history in agricultural areas (R=0.320), meaning that the more often you are exposed to pesticides, the higher the level of SGPT in your blood.

DISCUSSION

There is a positive correlation between kidney failure among farmers' wives who are registered as pesticide users and increasing if the woman is a direct pesticide user (Lebov et al., 2015). In addition, it does not rule out the possibility that the wives of farmers exposed to pesticides tend to be at risk of indirect exposure by husbands when returning home from farmland if they do not clean themselves properly carried through shoes, clothes, skin, or when washing pesticide containers at home (Lebov et al., 2015). The use of pesticides is often used to prevent pest attacks, so spraying will always be carried out whether or not there are pests. In pest control, organophosphate and carbamate insecticides are often used, they spray intensively to save the plants. Pesticide poisoning occurs due to the entry of pesticides into the body. The longer farmers are in the fields with frequent exposure to pesticides, the higher the risk of accumulation of toxins in the body. This is further strengthened by the lack of use of personal protective equipment during the use of pesticides.

Another factor that determines a farmer's skill is their ability to respond early to occupational injuries, such as sharp objects, animal bites, and pesticide poisoning. Farmers knew that dosage, spray time, and wind direction could cause poisoning. But only 46% of them know that certain types of pesticides can cause poisoning. Experienced poisonings range from respiratory poisoning that causes shortness of breath to itchy skin, eye irritation, and more (Minaka et al., 2016). Pesticides exposure experienced by farmers can be through various farmer activities such as the process of bringing pesticides to agricultural land, the process of mixing pesticides, the process of spraying pesticides on agricultural land, and washing tools that have been used to spray, all of these activities have the potential to cause health problems to farmers.

Farmworkers are more at risk of exposure to pesticides in the long term because it is reported that those who work for more than 10 years do not use personal protective equipment and do not comply with

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carrying out the results of the training that has been given (Walton et al., 2017). The longer the working period, the longer the contact with pesticides that occurs, so it has an impact on the number of exposures which causes the effectiveness of the immune system to decrease and affects the body to overcome the toxicity of a substance. The habit of spraying pesticides during the day when the sun is hot will cause the pesticides to evaporate and decompose and will result in pesticide poisoning in the hands and back that enters through the skin.

There is no use of PPE relationship to liver and kidney function. Most farmers do not adhere to the complete use of PPE which can lower the cause of the increased risk of exposure to pesticides (Reissman et al., 2006; Widianto et al., 2022). An internal factor approach for farmers is necessary to comply with the use of pesticide procedures that affect the health of farmers (Widianto et al., 2020). A factor that may be farmer capacity is the ability to use PPE, which becomes very important in agriculture. Farmers should be aware of the importance of protecting themselves from the risk of injury when using tools and sharps, exposure to direct sunlight, contact with pesticides, and other activities. Using PPE is one of his last resorts to injury. This study found an association between PPE use and injury incidence. Farmers with sufficient access to PPE, some knowledge of PPE, and a positive attitude are encouraged to encourage farmers to behave appropriately when using PPE. urge. Proper use of PPE in this way is expected to reduce the risk of injury and allow farmers to work optimally while increasing the productivity of their produce (Wismaningsih & Oktaviasari, 2016). Using PPE reduces the risk of injury and ensures comfortable work (Widianto et al., 2019). This can be explained by the possibility that there are harmful chemicals in pesticides that can affect kidney function and increase blood creatinine levels. By using PPE, the risk of exposure to these chemicals can be reduced so that the high risk of kidney disease can also be suppressed.

In the current industrial age, there are very high requirements that everything is done quickly and instantly. The same is true in the agricultural world, where he has three harvest seasons a year. In contrast to before, you can only harvest up to two times a year. Therefore, there must be substances that can rapidly support the growth process and development of plants. One of them is the use of pesticides. Farmers face many dangers and many suffer severe consequences. These include long-term exposure and adverse effects of fertilizers and pesticides (Chiu et al., 2015). This can be explained by the possibility that there is a toxin in the pesticide used, which can affect kidney function and increase urea levels in the blood. However, keep in mind that the relationship between pest levels and urea does not show definite causality, because many other factors can affect urea levels in the blood. These results can be used as a consideration for farmers in reducing pesticide exposure to themselves, their families, and consumers.

In this study, there were four variables observed, namely the use of PPE, exposure to pesticides, urea, and SGPT. The results show often farmers use PPE, the higher the levels of SGOT and SGPT in the blood. This may be due to farmers' lack of awareness in choosing the right PPE or farmers' lack of knowledge in using PPE. Another factor that affects a farmer's performance is their ability to handle pesticides. The use of these substances does not necessarily only improve agricultural productivity (Widianto et al., 2022). As well as just higher returns, there are also significant negative effects. The use of these pesticides harms human health as well as the environment. Therefore, a farmer must learn exactly which pesticides to use and his PPE to use to reduce the risk of injury. (Bondori et al., 2018). Comprehensive measures are needed to reduce exposure and health risks. This includes training, improved labeling, measures to lower cost barriers to implementing safe behavior, promotion of non-PPE control measures, and support for Integrated Pest Management (IPM) (Kapeleka et al., 2016).

In Indonesia, pesticide residues in horticultural products such as carrots, potatoes, mustard, onions, tomatoes, and cabbage have been reported to exceed the maximum level of 2 ppm in some vegetable-growing areas. Due to concerns about the effects of pesticide residues and hazards to human health, quality control of horticultural products must be safe for consumers, not just for appearance (Amilia et al., 2017). There is a relationship between the working period with impaired liver function in farmers in Sumberejo Village of Ngablak District Magelang district (p =0.030) and farmers who have a working period of more than 18 years are at almost twice as much risk of impaired liver function than farmers who have a working period of fewer than 18 years (Tsani et al., 2017). Sprayers who have working hours > 5 hours have a greater risk of pesticide poisoning than sprayers who have working hours ? 5 hours (OR = 5.22).1 The working period is the length of a person works in one year because pesticides are accumulative in the body, the longer the person works the more pesticides in his body that will eventually cause various

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adverse health effects, one of which is the most severe disorder. dap central nervous system in the form of body balance disorders (Samosir & Setiani, 2017).

The length of work is related to the length of time the farmer is in the work process and spraying after the linear regression test shows that there is a relationship between SGPT levels and the length of work. The demand for increased profits results in uncontrolled pesticide use that results in problems or risks of intoxication in farmers and the environment around pesticide use that can be acute or chronic. (Maisyaroh, 2019). In general, farmers can be exposed to pesticides through inhalation, ingestion, or direct contact with the skin which is then distributed through the circulation of blood vessels to affect various organs such as the liver and kidneys that are recognized as important organs involved in detoxification, through metabolism and excretion (Rai et al., 2022). The accumulation of pesticide exposure that enters the liver cannot be decomposed and excreted and stored in the liver which will disrupt the liver cells and organelles. The presence of damage to the liver parenchyma, and impaired permeability of the liver cell membrane so that enzymes free out of cells shown by the concentration of enzymes in the blood will increase (Dewi et al., 2021). Enzymes whose presence and levels in the blood are used as markers of impaired function include Serum Glutamic Oxsaloasetic Transamination (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT) (Tsani et al., 2017). Organochlorine pesticides, including DDT, may increase the risk of liver cancer (VoPham et al., 2017). Exposure to pesticides results in changes in liver function thereby increasing serum alanine amino-activity transferase (Manfo et al., 2020). Exposure to pesticides results in changes in liver function thereby increasing the serum activity of alanine aminotransferase (Manfo et al., 2020). SGOT has a strong positive relationship with the pest exposure variable that the more often you are exposed to pesticides, the higher the level of SGOT in your blood. SGPT has a strong positive relationship with the pest exposure variable that the more often you are exposed to pesticides, the higher the level of SGPT in your blood.

Chronic kidney disease (CKD) is a progressive disease characterized by a gradual loss of kidney function. This gradual loss of kidney function is directly related to the environment or work (Rai et al., 2022). These CKD-related environmental factors stem from exposure to agrochemicals (pesticides and fertilizers), exposure to heavy metals (cadmium, arsenic), food and water consumed, and chronic dehydration. Activities on agricultural land (agrochemicals) have an intensive relationship with CKD patients. Agrochemicals have harmful effects that can damage the kidneys by 1000 times (Fitria et al., 2020). Exposure to pesticides results in various impaired hematological parameters as well as kidney damage in humans (Hassanin et al., 2018). This can be explained by the possibility that the toxins in the pesticides used can affect liver function and increase levels of SGOT and SGPT in the blood. This shows the importance of using PPE and reducing the risk of exposure to pesticides containing hazardous chemicals, thereby reducing the risk of developing liver damage. However, keep in mind that the relationship between these variables still needs further research to determine definite causation and ensure clear causality. In addition, it is also necessary to consider other factors that can affect health and levels of substances in the blood, such as genetic factors, lifestyle, and work environment. Therefore, awareness and precautions in using pesticides are very important to avoid long-term health risks.

The longer farmers spray, the longer they are in contact with pesticides so the risk of pesticide poisoning is higher, this causes a decrease in the function of the liver as a poison penetration organ which also affects the decreased function of the kidneys, increasing creatinine and urea levels. SGOT is also found in blood cells, heart cells, and muscle cells, therefore an increase in SGOT does not always indicate abnormalities in liver cells. Therefore, an SGPT examination is also needed, when these two enzymes increase, there is certainly damage to the liver cells. The limitation of this study is the criteria for the research sample, more attention should be paid and added to other criteria such as the duration of spraying and the number of pesticides used and also caused by not directly examining blood cholinesterase levels. Therefore, further research can complement the limitations of this study.

CONCLUSION

From the results of this analysis, it can be concluded that the use of PPE and exposure to pesticides harm farmers' health, especially in liver and kidney function. Therefore, efforts are needed to increase awareness and knowledge of farmers in the proper use of PPE, as well as reduce exposure to pesticides in agricultural environments. Farmers' local knowledge and wisdom can assist in recognizing and early handling threats due to hazardous materials in the agricultural environment. In general, studies related to pesticide exposure show negative impacts on hu-

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man health, both acute and chronic, such as kidney damage, reproductive disorders, and cancer risk. Therefore, it is necessary to make efforts to minimize the risk of exposure to pesticides, including through the use of personal protective equipment.

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