



Factors Related To Liver Dysfunction On Female Farmers In Bandungan Village, Semarang Regency

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Excessive and improper use of pesticides can cause impaired health. Among the few organs in humans that are most vulnerable to the target of pesticides are liver organs. When there is disturbance or damage to the liver organs, it will interfere with the important function of the liver, namely metabolism and detoxification. Some studies have been conducted, indicating that there are negative effects on liver organs caused by pesticide use. This research aimed to analyze factors related to the incidence of liver function in female farmers in Bandungan

village, Semarang Regency. This research was observational research with a cross-sectional research design. The sampling technique used is purposive sampling (judgmental sampling). The number of samples used was 54 respondents aged between 15-49 years. The study showed that there were 9 (16.7%) Women of farmers who experience impaired liver function based on an abnormal SGOT and SGPT levels in Farmer's blood. Variables related to the incidence of liver dysfunction in female farmers was the working period ($p=0.015$) spraying frequency ($p=0.013$) and involvement of agricultural activities ($p=0.011$).

Keywords: pesticide, female farmers, liver disfunction

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Introduction

Bandungan Village becomes one of the villages whose soil uses pesticides to control pests that attack crops. The village is at an altitude of 892 masl with an area of 434.42 Ha². The area of agriculture in this village is 131.09 Ha which is dominated by vegetable plants, such as chili pepper, cabbage, tomato, carrot, and beans.(Badan Pusat Statistik Kabupaten Semarang, 2018)Pesticides used in agricultural areas in Bandungan village are pesticides of organophosphate Group and Carbamate. The use of excessive pesticides will cause an impact on the environment, namely leaving residues on the ground and causing land degradation.(Joko, Anggoro, & Sunoko, 2017) In addition to environmental impacts, pesticide exposure to organophosphate group will cause emphasis Against the enzyme function of Cholinesterase, which is an enzyme needed in the neurotransmitter system in humans, vertebrate animals, and insects.(Ganong, 2008)

The liver is one of the target organs of pesticides. The liver is the largest internal organ in the body. The liver Organ in the body is located on the upper right of the abdominal cavity below the diaphragm. The liver has a function as a place to produce bile, central protein metabolism, fats, and carbohydrates, cleanse the bilirubin of the blood, producing plasma proteins, as a center for detoxification of toxic substances in the body one of which is Pesticides, and as a place where the formation of erythrocytes or red blood cells in the life of the fetus in the womb and others.(Sherlock, 1990)

When there is disturbance or damage to the liver organs, it will interfere with the important function of the liver, namely metabolism and detoxification. Impaired liver function in peasant women of childbearing age, in addition to having an impact on the woman, will also affect her birth when the farmer is pregnant. Impaired liver function can interfere with food metabolism and detoxification on the mother's body so that it will affect the amount of food substances and other substances that enter the fetus.(Irianto, 2004)

Serum Glutamic Oxsaloasetic in Liver transaminases (SGOT) or Aspartate aminotransferase (AST), and Serum Glutamic Pyruvic in Liver transaminases (SGPT) or Alanine aminotransferase (ALT) is an enzyme in the blood whose content and existence becomes a marker of Disorders of the liver organ function. These enzymes under normal conditions are in the cells of the liver. When there is damage to the liver's organ cells, it can cause enzymes in the liver cells regardless of the bloodstream, so that the levels of the enzymes in the blood are increased. Elevated levels of these enzymes indicate impaired hepatic function.(Kosasih & Kosasih, 2008)

Some research on the exposure of pesticides with impaired liver function has been conducted, at the research of Awad O. et al in the year 2014, AST and ALT enzymes, total proteins, bilirubin, and cholinesterase enzyme activity are affected by pesticide exposure. Most of the farmers in this study are unaware of the importance of handling and management of pesticide use.(Awad, El-Fiki, Abou-Shanab, Hassanin, & El-Rahman, 2014)



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the study of Tsani in 2017 also showed significant results between exposure to pesticides with the incidence of liver function disorders in Farmers. A total of 67.4% of respondents to this study experienced impaired liver function.(Tsani, Setiani, & Dewanti, 2017)

From BPS Data of Semarang year 2018, 30.71% of the population of Bandungan village worked as a farmer. The work is not only done by men, but also by women. The farm Area in this village absorbs women labor nearly 50% of its.(Badan Pusat Statistik Kabupaten Semarang, 2018)

Methods

This research was conducted in Bandungan Village, Semarang Regency. This research draft is observational research with a cross-sectional approach. The large sample used in this study amounted to 54 female farmers. The sampling technique used is by purposive sampling (judgmental sampling). The samples on the study were women of farmers who were between 15-49 years old. How to collect data through interviews with questionnaires and conducted a sample examination of female blood farmers to know the level of SGPT and SGOT farmers. This examination is performed by health Laboratories of Central Java province. Data analysis used using Chi-square and logistic regression.

Results and Discussion

This research was conducted in Bandungan Village, Bandungan Sub District, Semarang Regency. All female-sex respondents. The average age of female farmers in this study is 36 years old, with the youngest age of 21 and the oldest age of 49 years. Appropriate educational characteristics are known that as many as 6 women farmers (11.1%) Not expired elementary school, 32 women farmers (59.3%) Graduated in SD, 12 female farmers (22.2%) Graduating from junior high school, and 4 female farmers (7.4%) Graduated high school. In this study, there were 9 (16.7%) Women of farmers who experience impaired liver function based on an abnormal SGOT and SGPT levels in Farmer's blood. Parameter impaired liver function in women farmers there are 3 variations, namely SGOT abnormal, SGPT is not normal, and SGOT and SGPT are not normal.

Table 1 Relationship between independent variabels with liver disfunction with logistic regression analysis

No	Variable	B	p-value	Exp (B)	CI 95%	Description
1.	Working period	0.199	0.015	1.221	1.039-1.434	Significant
2.	Lenght of work	0.075	0.833	1.078	0.538-2.158	Not Significant
3.	Spraying frequency	1.584	0.013	4.873	1.396-17.011	Significant
4.	Number of pesticide types	0.914	0.058	2.493	0.970-6.407	Not Significant



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Table 2 Relationship between independent variables with liver disfunction with chi-square analysis

		Liver Disfunction				P- value	PR (CI 95%)	Description
No	Variables	Yes		No				
		n (54)	%	n (54)	%			
1	Use of PPE					0.531	2.000 (0.221-18.112)	Not significant
	Complete	8	18.2	36	81.8			
	Incomplete	1	10.0	9	90.0			
2	Pesticide Dosage					0.179	2.737 (0.606-12.350)	Not significant
	As recommended	6	24.0	19	76.0			
	Not as recommended	3	10.3	26	89.7			
3	Involvement of agriculture activities					0.011	10.947 (1.261-95.057)	Significant
	Risky	8	29.6	19	70.4			
	Not risky	1	3.7	26	96.3			

From the tables above, shows that of the 7 independent variables that are in the analysis, 3 variables relate significantly to the incidence of liver function in female farmers in Bandungan village. The variable is the working period ($p = 0.015$), the frequency of spraying ($p = 0.013$), and the engagement of agricultural activity ($p = 0.011$).

These results indicate that the variable of the work period is a risk factor in the occurrence of liver dysfunction in female farmers with p-value 0.015, r-value = 1.221 (CI 95% 1.039-1.434). The working period is influential or becomes a risk factor of impaired liver function due to the longer the working period of the farmer, the longer the farmer's contact with pesticides resulting in the accumulation of pesticides in the body. The accumulation of pesticides in the body of the farmer will result in disruption of the organs in the body, one of which is the liver. Pesticides can damage plasma membranes so that various enzymes located in the cytosol will enter the blood circulation as a result of the permeability of cell membranes so that the levels of enzyme aminotransferase in the blood will increase. (Ahmed, Hasona, & Salemain, 2017)

Pesticide exposure does not necessarily directly give a significant impact on the human body and without sudden pain. Conversely, pesticides that enter the body will accumulate in a long time until women of farmers experience chronic poisoning. Pesticide poisoning indicates that the accumulation of pesticides in the female body of the farmer that the if is allowed to continuously cause interference to the female organs of the farmer's body, one of which is impaired on liver function.

The results of this study were in line with the study conducted by Tsani in Sumberejo village in 2017 which stated that the work relates to the occurrence of impaired liver function in farmers ($p = 0.030$). (Tsani et al., 2017) Other research that is also in line with research It is a 2016 Osang research in Pagian village indicating that the working period of the farmer is associated with pesticide poisoning ($p = 0.000$). (Osang, Lampus, & Wuntu, 2016) Research conducted by Ipmawati in Jati village in 2016 also showed the same results, namely, there is a link between the labor period and pesticide poisoning in the farmer ($p = 0.001$). (Ipmawati, Setiani, & Darundiati, 2016)



The length of the work variable in this study showed no relationship between the working period with the incidence of liver function in female farmers in Bandungan village with $p = 0.833$. The results of this research show that the average farmer working in the farm area in a day is 7-8 hours. There were 25 respondents or 46.3% of respondents who worked for 8 hours per day in the agricultural area.

The length of work that is not related to the occurrence of liver function can be caused because of the long work of farmers who have impaired liver function averages working for 7 hours per day, similar to other farmers who do not experience impaired liver function. Women farmers usually start activities in the agricultural area in the morning from 07.00-12.00. then they rest home and continue the activity in the farm area back at 14.00-16.00. Rest time is usually used by women farmers for lunch, prayers and sleep for a while. Research conducted by Raini in 2004 shows that the break influences the Cholinesterase's activity. Milby's research in Raini showed that a return of 25% plasma cholinesterase activity generally occurred at the time of 7-10 days.(Raini, Dwiprahasti, & Sukasediati, 2004)

The results of this study in line with the study of Tsani in 2017 which showed no relationship between the length of work with the incidence of impaired liver function in farmers in the village SumberejoNgablak District Magelang ($p = 1.000$). 10 Other research inline is the Dewanti research on Tahin 2013 which indicates that there is no relationship between the working period per day with impaired liver function at the gold mineworker at Wonogiri ($p = 0.148$). (Astorina, Dewanti, & Setiani, 2013)

The next variable, is variable frequency spraying. The frequency of spraying in the study showed there was a link between the frequency of spraying with the incidence of liver function in female farmers in Bandungan village with $p = 0.042$. $r\text{-value} = 4,873$ (CI 95% 1.396-17,011). Generally, the respondent sprays the plant 1-3times a week depending on the type of plants sprayed. In this study, respondents whose frequency of spraying more than 2 times a week were 15 respondents or 27.8%. The results of the interviews, spraying will be done more often in the rainy season because the emerging pests will be increased. Spraying is usually done in the morning or in the afternoon. The spraying is still within a reasonable limit of 1-2 times a week. In the Raini study in 2004 years found that a minimum break of one week could raise the activity of cholinesterase on farmers. A minimum break of one week in subjects with mild poisoning may raise the enzyme activity of the cholinesterase into a normal return.(Raini et al., 2004)

The more often spraying is done, the higher the risk of pesticide poisoning can occur. Pesticide exposure with frequent frequencies with short time intervals causes pesticide residues in the body to be higher. This research is not in line with the research of Rezilawaty in 2013 that shows no link between the frequency of spraying with impaired liver function on farmers in the Losari village Sumowono District Semarang.(Rezilawaty, 2013)

In the variable, the number of pesticide types in this study showed that there is no relationship between the number of pesticide types used with the incidence of liver function in female farmers in Bandungan village with $p = 0.058$. All respondents to this study used pesticide blends on each spraying. Insecticides and fungicides often mixed are types of pesticides organophosphate and Carbamate. Spraying recommended by the agriculture service is spraying



for one type of pesticides done once and continued with spraying other types of pesticides or not mixed. Mixing some types of pesticides is not recommended because it will cause adverse effects, feared will cause cross-resistance and harm the health of the farmers themselves.(Djojsumarto, 2000)

The use of PPE variable in this study showed no relation to the incidence of liver function disorders in peasant women in Bandungan village with $p = 0.531$. In this study, there were only 10 respondents of a total of 54 respondents who used a complete self-protection tool. Pesticides can get into the body through various means, among others can be through the respiratory tract or skin. One way to prevent the absorption of pesticides by the body is to use the Personal protective equipment (PPE) to protect the body parts potentially as the main pathway of pesticides enters into the body.(Suma'mur, 1996) Exposure through channels Respiration usually occurs when applying pesticide products without the use of protective. The reported respiratory symptoms related to exposure to pesticides include shortness of breath, wheezing, sore throat, cough, and chest tightness.(Negatu, Kromhout, Mekonnen, & Vermeulen, 2017)

The pesticide dosage variable in this study showed no connection to the incidence of liver function disorders in female farmers in Bandungan village with $p = 0.179$. All types of pesticides are toxic, the larger the dose it will be the greater occurrence of pesticide poisoning. Because when the dose of pesticide use increases, the effect of pesticides will also increase. The dose-appropriate pesticide dosage is associated with the incidence of organophosphate pesticide poisoning in farmer sprayers. Inappropriate dosages have a risk of four times for poisoning occurring than spraying is performed according to the rule dose.(Wudianto, 1999)

Research that is not in line with this research is Asror research year 2008 which shows that there is a link between doses of pesticides with the incidence of pesticide-poisoning organophosphate on farmers in Ngablak sub-district ($p = 0.003$). (Asror & D, 2008) On Minaka's research in 2016 showed that 78.2% of total farmer respondents used pesticides exceeding the recommended dosage, and 58.5% suffered from health disorders or poisoning.(Minaka et al., 2016)

Based on the results of the test that has been conducted, showed that the activity of the involvement of agricultural activities there is a relationship with the occurrence of liver function in the female farmers in Bandungan village. The p-value in this variable shows the value of 0.011 with r-value = 10.947 (CI 95% 1.261-95,057). Agricultural activities commonly done by women farmers are planting, harvesting, eradicating pests, cutting leaves and stalks, preparing pesticides, mixing pesticides, spraying pesticides, and washing clothes and tools used to Spray.

When conducting activities in the agricultural area, pesticides can be absorbed into the female body of the farmer through the respiratory tract. Pesticides in the form of aerosols will spread in the farming area and enter the female farmer's body. Pesticide absorption can also occur through the skin, while women farmers do activities such as preparing and mixing pesticides. The activity of washing and the tools used to spray also increase the absorption of pesticides through the skin in peasant women. These activities allow women farmers to direct contact with pesticides.



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Table 3 Multivariate Analysis results

No	Variable	B	p-value	Exp (B)	CI 95%
1.	Working period	0.093	0.250	1.097	0.937-1.284
2.	Spraying frequency	2.177	0.010	8.822	1.675-46,472
3.	Number of pesticide types	0.848	0.110	2.335	0.826-6.608
4.	Pesticide dosage	-1.605	0.211	0.201	0.016-2.478
5.	Involvement of agriculture activities	-3.813	0.048	0.022	0.001-0.972

From the above multivariate analysis, it can be interpreted that the frequency of spraying and the involvement of agricultural activities is a dominant factor in the incidence of liver function disorders in Bandungan village ($p < 0.05$).

Conclusion

The average age of female farmers in this study was 36 years. The last average education women received was graduated from elementary school as much as 59.3%. There are 9 (16.7%) Women of farmers who experience impaired liver function based on an abnormal SGOT and SGPT levels in Farmer's blood. There is a relationship between the working period ($p = 0.015$), the frequency of spraying ($p = 0.013$), and the involvement of agricultural activity ($p = 0.011$) with the incidence of liver function in female farmers in BandungansubdistrictBandungan District Semarang. There is no relationship between the length of work ($P = 0.833$), the number of pesticide types ($p = 0.058$), the use of APD ($p = 0.531$), and the pesticide dose ($p = 0.179$) with the incidence of hepatic dysfunction in the peasant woman in BandungansubdistrictBandungan District Semarang Regency .

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