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Gestational Hypertension in associated with Maternal's Agricultural Working Period at Ngablak Subdistrict, Central Java Indonesia: A Cross-Sectional Study

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Abstract : ***The area of Ngablak Subdistrict, which is wide for agriculture and the majority of the population is farmers, illustrates the high use of pesticides. The involvement of pregnant women in agricultural activities for many years can lead to gestational hypertension because it is directly and indirectly exposed to pesticides. Pregnancy hypertension is harmful to pregnant women because it can cause interference with the fetus until death. This study aims to prove the relationship between working period as a farmer and the incidence of hypertension in pregnant women in Ngablak District, Central Java, Indonesia. This type of research includes analytic observational research with a cross-sectional approach in 60 pregnant women. The purposive sampling technique is used for the sampling process. Data analysis in this study uses Chi-square test. Based on the results of the bivariate analysis, it was found that there was a significant relationship between the period of service as a farmer (p value = 0.023) for the incidence of hypertension in pregnant women in Ngablak District, Central Java, Indonesia. Working period variables as farmers are known as risk factors for hypertension so that pregnant women must use complete PPE and reduce the intensity of involvement in agricultural activities as a form of minimizing exposure to pesticides.***
Keywords: hypertension, gestational hypertension, maternal, pesticide exposure, working periode.

I. INTRODUCTION

Ngablak sub-district with an area of 43.78 m^2 is mostly used as agriculture with vegetables as products. As many as 40.12% of the total population of the Ngablak Subdistict, 38.738 people work as farmers.[1] Pesticides are chemicals that have been used since 1970 in Ngablak District. Organophosphate type pesticides are the most reliable type because they are strong and powerful and easily dissolved. Because of its superiority, farmers continue to use organophosphates as other types of pesticides develop with different active ingredients.[2] As many as 40.12% of Ngablak residents who work as farmers are pregnant women, among them. Based on interviews, pregnant women carried out relatively easy farming activities such as spraying, weeding and harvesting. Spraying activities performed by pregnant women differ from their husband. Pregnant women do not spray using a 17-liter sprayer because it is too heavy to carry it. All pregnant women have worked as farmers in an average working period of ≥ 3 years. During this time pesticides are used to control pests and get the best crops. Using pesticides for a long time will cause accumulation in the body if not followed by the use of PPE. This happens because pesticides can enter through breathing, skin and digestive system contamination. The function of PPE is to limit and reduce the level of exposure to pesticides so as not to enter the body. If the active ingredient of pesticides into the body will cause poisoning in humans. [3] The active ingredient is carried in the bloodstream and then flows to the central nervous system so that it can interfere with or damage the metabolic system in the body. The pesticide toxicity is by inhibiting the impulse delivery process, pesticide compounds bind the enzyme acetylcholinesterase so that the hydrolysis process is disrupted. The effect of poisoning occurs in the central nervous system so that it interferes with the work of the muscles until a nicotinic effect arises which causes hypertension in a person. [4] Gestational hypertension is a concern for the Indonesian government, especially for Ngablak subdistrict because it has a bad effect on pregnant women and the condition of the fetus. From preliminary study stated that the rate of gestational hypertension at Ngablak sub-district in 2016 was 17 cases out of 393 pregnant women. Hypertension can cause fetal growth and developmental disorders and also it can develop into preeclampsia which causes death for pregnant women. As Saldana stated in 2009 that pesticide exposure in pregnant women living in agricultural areas and involved could increase the risk of pregnancy hypertension. [5] Today all farmers in Ngablak subdistrict is still using pestisides relatively high. More by pregnant women who have worked as farmers for a long time and have been exposed directly or indirectly.

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Based on these data, this study was conducted with the aim to determine the relationship of the working period of pregnant women as farmers with the gestational hypertension.

II. MATERIALS AND METHODS

A. *Subject*

All participants were pregnant women who lived in the agricultural area of Ngablak subdistrict. The selected criteria are pregnant women who are pregnant with a gestational age of ≥20 weeks and are farmers. The willingness of pregnant women to be the subject of research is evidenced by filling in the inform consent form. The sampling technique uses purposive sampling and for the number of samples as much as 60 obtained from the calculation with a cross sectional formula based on categorical data.

B. *Experimental Design*

In this study, research subject data was collected by means of interviews and home surveys related to pesticide management. Blood pressure examination for pregnant women is done using a spigmomanometer. The examination aims to determine the status of the presence or absence of hypertension in selected research subjects. The research location in Ngablak Sub-district was chosen because of the incidence of hypertension in pregnant women which could be caused by excessive use of pesticides when conducting agricultural activities. This type of research is analytic observational with cross sectional research design.

C. *Statistical Analysis*

A number of variables were used in this study to measure whether pesticide exposure is a risk factor for the incidence of hypertension in pregnant women. There are four independent variables studied, namely nutritional status of pregnant women, gestational age, parity and years of service as farmers. The dependent variable in this study is the incidence of hypertension in pregnant women. In this study, each independent variable and the dependent variable were first analyzed using univariate analysis. To prove the results of the hypothesis and bivariate analysis was performed using the Chi-square test.

III. RESULT AND DISCUSSION

Based on univariate analysis on the dependent variable, of the 60 pregnant women who were the subjects of the study there were 18 pregnant women who had hypertension. All pregnant women interviewed entered ≥20 weeks of gestation. A total of 60 pregnant women were recorded as farmers but only 43 claimed to be involved in agricultural activities during pregnancy. Forms of involvement by pregnant women when active in farming are spraying (9 respondents), harvesting (38 respondents) and weeding (13 respondents). The results of the bivariate analysis showed that the variable working period as a farmer was a risk factor for the incidence of hypertension in pregnant women.

Tabel 1. Characteristics of Partisipants at Ngablak Regency, Central Java, Indonesia

CHARACTERISTICS	n	%	TOTAL
Maternal Age (years)			
• < 20	14	23.3	60 (100)
• 20-35	38	63.3	
• >35	8	13.3	
Gestational Age (weeks)			
• 13-27	36	56.7	60 (100)
• > 28	24	43.4	
Parity			
• Nullparity	22	36.7	60 (100)
• Multipary	38	63.3	

Source: Primary data

Tabel 2. Risk Factor's Distribution in associated with Pregnancy Hypertension

No	Variabel	Hipertensi	Tidak Hipertensi	Total n = 60	P value	RP	95% CI
1	Maternal Age (years)						
	▪ High Risk (<20 and >35)	7 (31.8)	15 (68.2)	22 (100)	1.000	1.099	0.499 – 2.419
	▪ Low Risk (20-35)	11 (28.9)	27 (71.7)	38 (100)			
2	Gestational Age (weeks)						
	▪ Second Trimester (13-27)	11 (32.4)	23 (77.3)	34 (100)	0.865	1.202	0.541 – 2.670
	▪ Third Trimester (>28)	7 (26.9)	19 (73.1)	26 (100)			
3	Parity						
	▪ Nulliparity	5 (22.7)	17 (77.3)	22 (100)	0.520	0.664	0.273 – 1.614
	▪ Multipary	13 (34.2)	25 (65.8)	38 (100)			
4	Working Period (years)						
	▪ ≥ 3	15 (48.4)	16 (51,6)	31 (100)	0.003	4.677	1.509 – 14.501
	▪ < 3	3 (10.3)	26 (89.7)	29 (100)			

Source: Primary data

A. Maternal Age

The results of the study stated that there were 14 pregnant women (36.6%) aged <20 years and 8 pregnant women (13.3) aged> 35 years. Pregnant women of extreme age (<20 years and> 35 years) found 7 pregnant women (31.8%) had hypertension. Pregnant women who are pregnant in such extreme ages can endanger themselves and their fetuses. The reason is that at the age of <20 years the female reproductive organs have not been fully formed so that they are not ready as a place for developing the fetus. Besides that, another danger that occurs is that pregnant women experience a faster increase in blood until they can cause seizures. At the age of> 35 years a woman can experience a decline in the function of the reproductive organs so that with increasing age, there is an increase in blood pressure. [6]

The bivariate analysis showed no relationship between age and incidence of hypertension in pregnant women in Ngablak District (p value = 1.000). This is because pregnant women regularly check their pregnancy conditions at the health center / clinic. If pregnant woman founded with symptoms of hypertension, the health worker immediately provides special treatment to minimize the development of increased blood pressure before becoming hypertensive. Other studies have high risk factors for hypertension in pregnancy. Increased maternal age and BMI are associated with increased risk for late PE and GH but not early-PE. Previous studies also reported an association between increased maternal age and BMI with risk for hypertensive disorders, especially in developed countries. [7]

This study are in line with Shen's research which states that there is no significant relationship between pregnant women and hypertension in pregnant women.[8] This study are not in line with the research of Saraswati and Mardiana which states the relationship between the age of pregnant women and the incidence of preeclampsia. Pregnancy at an extreme maternal age is a high-risk pregnancy and can cause complications. This complication is the occurrence of hypertension which can develop into preeclampsia marked by the presence of protein in the urine of pregnant women. [9] Just like the study by Nursal et al., Which stated that pregnant women aged <20 and >35 years were at 4.886 times the risk of preeclampsia compared to pregnant women aged 20-35 years. [10] Pregnant women who are at risk of hypertension are advised to conduct antenatal care checks regularly with the aim of early detection of symptoms of hypertension and then given adequate treatment so that conditions are not getting worse, and adequate rest to prevent pregnancy hypertension is growing. [10]

B. Gestational Age

In this study 36 pregnant women (56.7%) were pregnant with 13-27 weeks of pregnancy (second trimester) and 24 pregnant women (43.4%) were pregnant with gestational age> 28 weeks (third trimester). The gestational hypertension occurred in 11 pregnant women (32.4%) with second trimester of pregnancy and 7 pregnant women (26.9%) with trimester III pregnancy. Gestational hypertension is characterized by the new onset of hypertension after 20 weeks of gestation without any maternal or fetal features of

preeclampsia, followed by return of blood pressure to normal within 3 months post-partum. At first presentation this diagnosis will include some women (up to 25%) who are in the process of developing preeclampsia but have not developed proteinuria or other manifestations. Some women initially diagnosed in this category will be beyond 12 weeks of manifest persistent blood pressure elevation and eventually be classified as having chronic hypertension. [11]

Gestational hypertension near term is associated with little increase in the risk of adverse pregnancy outcomes. The earlier the gestation at presentation and the more severe the hypertension, the higher is the likelihood that the woman with gestational hypertension will progress to develop preeclampsia or an adverse pregnancy outcome. Severe hypertension (≥170/110mmHg) is associated with increased risk of adverse outcomes in pregnancy.[11] The bivariate analysis showed that there was no significant relationship between gestational age and the incidence of hypertension in pregnant women in Ngablak subdistrict. This is because every entering the second trimester of pregnancy the health workers at the health center in Ngablak always invite pregnant women and remind them for antenatal care. Health workers realize that entering the second trimester of pregnancy is a condition that is prone to experiencing hypertension pregnancy.

This research is in line with research by Ledda et al. which states there is no significant relationship between gestational age and hypertension in pregnant women in Italy. [12] Another study by Nursal et al. also mentioned the same thing that there was no significant relationship between gestational age and the incidence of preeclampsia in pregnant women in Padang. [10] Although the results of the study showed no relationship, it was mandatory for pregnant women to conduct antenatal care checks regularly. The examination aims to determine the health conditions of pregnant women and fetal development.

C. Parity

60 pregnant women who were examined were 38 pregnant women (63.3%) classified as multiparious and 22 mothers (36.7%) were classified as nulliparity. A total of 5 nulliparity pregnant women and 13 multiparity pregnant women developed hypertension. Gestational hypertension to preeclampsia can occur in pregnant women with nulliparity, namely the condition of mothers who have never given birth. This is because immunologically the formation of blocking antibodies to the placental agent in the first pregnancy is imperfect so that an immune response arises which is not favorable to placental histo-compatibility. [13]

The bivariate analysis showed that there was no significant relationship between parity and the incidence of hypertension in pregnant women in Ngablak District. This is because pregnant women always conduct antenatal care checks to the health center for 4 times from the beginning of pregnancy to preparation for childbirth. The purpose of antenatal care is to examine the physical condition of pregnant women and detect early or absent complications. [14] According to the Indonesian Ministry of Health the aim of antenatal care is to keep pregnant women from going through their pregnancy, childbirth and childbirth well and safely and giving birth to healthy babies. [15]

This research is in line with Nursal's research which states that there is no relationship between gravida status (parity) and the incidence of preeclampsia in pregnant women in Padang in 2014. [10] In contrast to research in pregnant women in Cameroon who stated that parity is a risk factor for the incidence of hypertension. [16] Research by Radjamuda also stated that there was a significant relationship between parity and the incidence of hypertension in pregnant women in the city of Manado. [17] Considering parity as a risk factor, primiparous or multiparous pregnant women should take part in family planning counseling at the community health center together with professional health workers to prevent and avoid the risk of hypertension. [10]

D. Maternal's working period

A farmer who works using pesticides for a long time can cause chronic poisoning. The longer the working period of the farmer, the more the level of absorbed pesticides then accumulates in the body so that it decreases cholinesterase activity [18]. Participants in this study on average have worked as farmers within <3 years. Chi-square test results show that there is a significant relationship between the tenure as a farmer and the incidence of hypertension in the respondents (p value = 0.023). The value of RP = 2.714 in the analysis also proved that farmers with a working period of ≥ 3 years had 2.7 times the risk of experiencing hypertension compared to farmers with a working period of <3 years. Working period of more than 3 years is a risk factor for the incidence of hypertension in pregnant women. Gestational hypertension due to the more frequent work and exposure to pesticides, the bioaccumulation potential of pesticide residues in the body occurs, causing chronic poisoning. [19] Pesticides, especially organophosphate groups inhibit impulse delivery activity by binding the enzyme acetylcholinesterase irreversibly so that the hydrolysis process is disrupted. This event causes accumulation of acetylcholine on the nerve endings so that nicotinic effects appear in the form, one of which is hypertension. [4] Pesticides that enter the body are carried in the bloodstream and can flow to the central nervous system. In these areas pesticides inhibit the action of the enzyme acetylcholinesterase which causes acetylcholine to

be hydrolyzed and then accumulates in the central nervous system. Acetylcholine buildup causes hyperpolarization and receptor desensitization and causes mucarinic effects and nicotinic effects. Hypertension is a form of increasing nicotinic effects that arise. [4] The results of this study are in line with Louisa in 2018 which states that there is a significant relationship between the working period and the incidence of hypertension in rice farmers in Gringsing Village (p value <0.05). Louisa said that the length of work concluded that farmers were permanent jobs in the area. Farmers always rely on pesticides to control pests so that pesticide use increases and pesticide exposure cannot be avoided. This is what affects the accumulation of pesticide levels in the body of the farmer [20].

IV. CONCLUSION

Pregnant women who have gestational hypertension in this study were 18 out of 60 participants. Working period of farmers is proven to be a risk factor for gestational hypertension. This variable cannot be avoided because the work as a farmer will still be carried out, but this can be limited. During work pregnant women are required to use complete PPE and reduce farming involvement especially when pesticides are being applied. The limitation in this study is that there is no cholinesterase test so it is not known how much the level of poisoning of pregnant women causes gestational hypertension. Another limitation is cross-sectional research design where independent variables, co-founding variables and dependent variables are measured at the same time so that the cause and effect are difficult to know. Hypertension can be a health threat to pregnant women and babies, early detection of hypertension is done to prevent the occurrence of maternal death. The existence of this research is beneficial for the agricultural department so that it continues to educate and establish regional regulations related to the limitations of pesticide use by farmers. The health service / Ngablak Puskemas must provide information about poisoning that will occur to the community, especially pregnant women as a result of the use & management of pesticides that are not as recommended.

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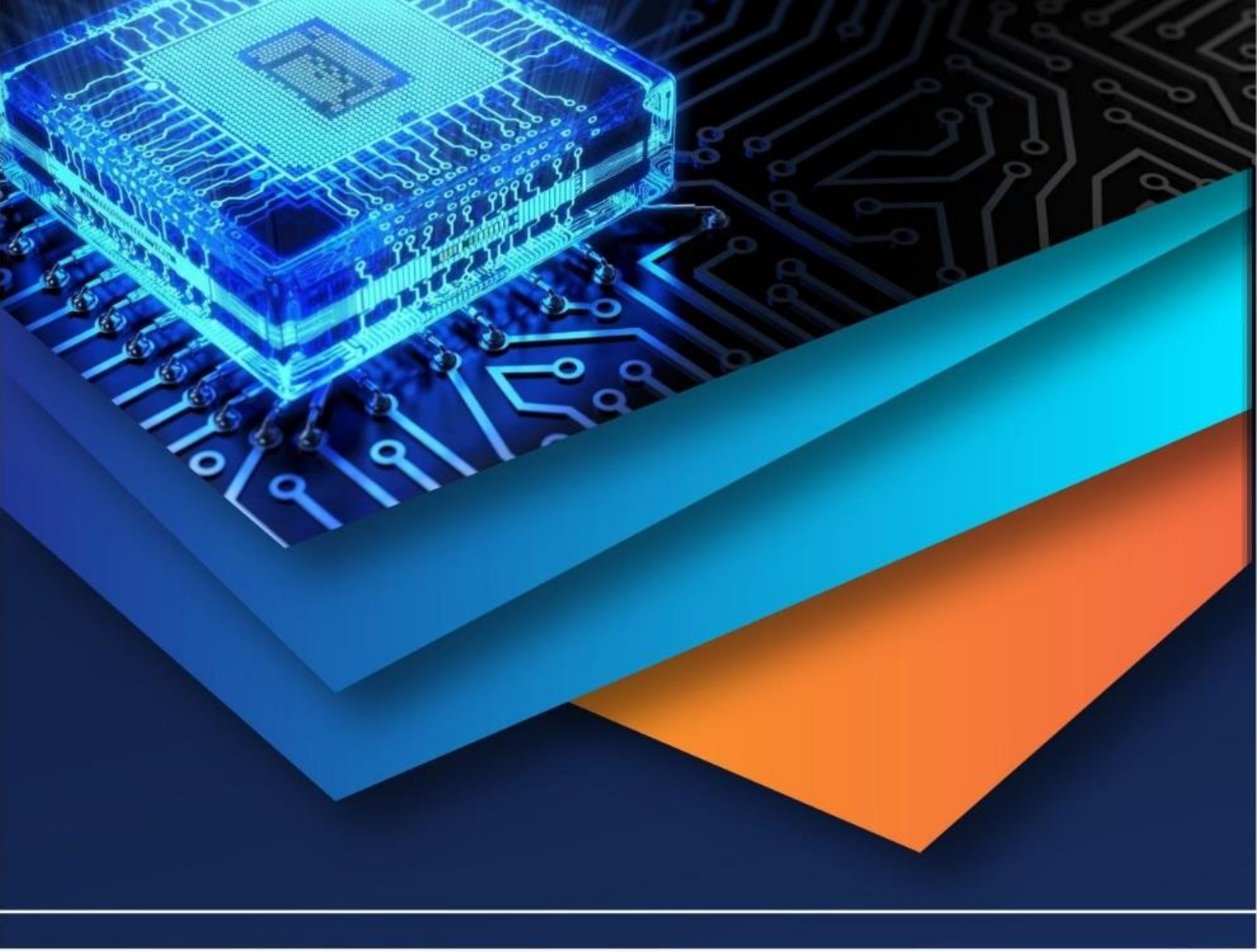

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