Does Secondary Smoking and Posyandu Affect the Risk of Hypertension in Pregnancy? Multilevel Evidence from Magelang, Central Java

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ABSTRACT

Background: Pregnancy hypertension was a complication of pregnancy which became one of the causes of maternal and perinatal morbidity and mortality in the world. This study aimed to determine the effect of individual and contextual factors of integrated health post (posyandu) on hypertension in pregnancy.
Subjects and Method: A case control study was conducted in 5 posyandus in Magelang, Central Java, from April to May 2019. A sample of 210 women was selected by simple random sampling. The dependent variable was hypertension in pregnancy. The independent variables were age, parity, nutritional status, family history of hypertension, history of hypertension before pregnancy, history of hormonal contraceptive, and exposure to cigarette smoke. The data were collected by questionnaire and analyzed by a multilevel multiple logistic regression.
Results: Hypertension in pregnancy increased with age <24 or > 35 years old (b= 2.10; 95% CI= 0.16 to 4.04; p= 0.033), parity (b= -3.81; 95% CI = - 6.31 to -1.32; p = 0.003), nutritional status (b= 3.35; 95% CI= 1.36 to 5.33; p= 0.001), family hypertension history (b= 3.35; 95% CI= 1.33 to 5.37; p= 0.001), hypertension history before pregnancy (b= 2.46; 95% CI= 1.1 to 3.81; p<0.001), hormonal contraceptive history (b= 2.6; 95% CI= 0.53 to 4.72; p= 0.014), and cigarette smoke exposure (b= 2.87; 95% CI= 1.15 to 4.58; p= 0.001). Posyandu had negligible contextual effect on hypertension in pregnancy with ICC= 7.6%.
Conclusion: Hypertension in pregnancy increases with age <24 or > 35 years old, parity, nutritional status, family hypertension history, hypertension history before pregnancy, hormonal contraceptive history, and cigarette smoke exposure. Posyandu has negligible contextual effect on hypertension in pregnancy.

Keyword: Hypertension, pregnancy, cigarette smoke, multilevel analysis

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BACKGROUND

Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) in Indonesia were still major health problems. One of the targets to be achieved by 2030 in Indonesia in the Sustainable Development Goals (SDGs) was to reduce the ratio of maternal mortality to less than 70 per 100,000 births and end infant mortality to at least less than 12 per 1000 births. The Maternal Mortality Rate in Indonesia was still far from the SDGs target, recorded in 2015 MMR in Indonesia reached 305 per 100,000 live births, while the Infant Mortality Rate (IMR) reached 22.23 per 1,000 live births (Indonesian Health Profile, 2016). Hypertension in pregnancy was a complication of pregnancy which was one of the causes of maternal and perinatal morbidity and mortality in the world. Risk factors for hypertension in pregnancy include age, education, parity, history of

body mass index before pregnancy, hypertension history, family history of hypertension, and exposure to cigarette smoke, and history of contraception (Chelchowska et al., 2013; Hanum and Wibowo, 2016; Imaroh and Nugraheni, 2018; Sariet al., 2016). In reducing AKI and AKB related to maternal and child health problems, one of the efforts was the existence of Posyandu and antenatal service programs (Central Java Provincial Health Office, 2016).

Estimates of mortality caused by preeclampsia in the world reached 50,000 to 60,000 cases each year (Roberts et al., 2013). Almost one-tenth of maternal deaths in Asia and Africa were associated with pregnancy hypertension, as well as in Latin America a quarter of maternal deaths are associated with disorders (World Health Organization, 2011). In the United States, hypertension in pregnancies including chronic hypertension, gestational hypertension, and preeclampsia often occurs in 6-8% of pregnancies that can cause maternal and infant mortality and morbidity (Gudnadóttir et al., 2016).

In 2013, in Indonesia, hypertension in pregnancy was the cause of maternal mortality, the proportion of which increased with the death rate reaching more than 25% (Indonesian Health Profile, 2016). The number of cases of maternal deaths in Central Java in 2018 reached 421 cases with the largest cause of maternal deaths due to preeclampsia with a percentage of 36.8% and followed by other causes of death ranked second with a percentage of 35.4%, followed by bleeding with a percentage 22.6% (Central Java Provincial Health Office, 2018). Based on a preliminary study at the Magelang District Health Office in 2018 there were 131 cases of preeclampsia in Magelang District with the most cases in the work area of Muntilan Public Health Center 1.

Preeclampsia was a classification of hypertension in pregnancy that could cause death in mothers and infants. The high incidence of hypertension in pregnancy in Magelang Regency resulted special attention to be able to prevent an increase in the prevalence of hypertension in future pregnancies. One of the efforts to reduce MMR and IMR was by the existence of Posyandu.

Posyandu was a form of community-based health care efforts in the implementation of health development by empowering communities to obtain facilities in public health services, one of which was maternal and child health problems (Central Java Provincial Health Office, 2016). Posyandu had a level of development that was assessed through strata. There were 4 strata of Posyandu namely pratama, madya, purnama, and mandiri strata. Pratama Posyandu was the lowest strata assessed from its non-routine service activities and the number of cadres was still limited, while the independent posyandu was the highest level of development of posyandu with qualifications to carry out activities regularly, coverage of 5 main programs is good, there were additional programs and availability of healthy funds which reached 50% of households (Magelang District Health Office, 2017). Pregnant women who carry out antenatal care or regular antenatal care at Posyandu can be monitored by health personnel and health cadres and the benefits can prevent complications of pregnancy including preventing the development of hypertension in pregnancy so that maternal mortality and morbidity and infants can be prevented.

With the increasing strata of Posyandu, it is expected that the more optimal activities, especially early detection of prevention of the development of pregnancy complications, especially hypertension, could be a major cause of maternal and

neonatal mortality and morbidity. However, it should be noted also the risk factors of mothers that affect the incidence of hypertension in pregnant women such as age factors.

Pregnancy of women under the age of 20 has a greater risk of developing hypertension compared to pregnant women aged 20-30 years (Dewi, 2016). Other studies support that risk factors for mothers experiencing hypertension in pregnancy included age where the reproductive age is too young or too old, education, employment, family income, parity, family history of hypertension, history of hypertension before pregnancy, and body mass index (Imaroh and Nugraheni, 2018). Exposure to cigarette smoke according to Hanum and Wibowo (2016) also becomes one of the risk factors for hypertension in pregnant women because there is a content that is dangerous for pregnant women in cigarette smoke. Like the research conducted by Chelchowska et al., (2013) that in cigarette smoke there is a lead (Pb) content and if there is an increase in Pb levels in the blood of pregnant women it can be a risk factor for hypertension in pregnancy. A history of contraceptive use is also another predictor of the occurrence of hypertension in pregnancy. Sari et al. (2016) found that contraceptive use had a risk of 1.32 times greater risk of developing hypertension in pregnancy compared to hypertensive pregnant women who did not use family planning.

Hypertension in pregnancy was a complication of pregnancy that could cause death in the mother and also morbidity in infants. The need to prevent the development of hypertension in pregnancy was one way to prevent mortality and morbidity in the mother and baby. Based on the problems regarding hypertension in pregnancy described above, the authors would like to know about the influence of individual levels and the contextual influence or influence of the level of the Posyandu on the incidence of hypertension in pregnancy in the Magelang region.

SUBJECTS AND METHOD

a. Study Design

This was an analytic observational study with a case control design. The study was conducted in 5 integrated health posts (posyandu) in Magelang, Central Java, from April to May 2019.

b. Population and Samples

The target population was all pregnant women in Mertoyudan, Mungkid, Muntilan 1, Bandongan, and Borobudur community health centers (puskesmas). A total of 26 posyandus was selected by stratified random sampling. A sample of 210 women was selected by simple random sampling.

c. Study Variables

The dependent variable in the study was hypertension in pregnancy. The independent variables were age, parity, nutritional status, family history of hypertension, history of hypertension before pregnancy, hormonal contraception history, and exposure to cigarette smoke.

d. Operational Definition of Variables

Hypertension in pregnancy. Hypertension in pregnancy was defined as an increase in blood pressure in pregnancy with systolic >140 mmgg or diastolic ≥90 mmHg. The data collection was carried out using the results of measurements carried out on pregnant women using sphygmomanometers. The measurement scale was continous, but for data analysis, it was transformed into dichotomous.

Age. Age was defined as length of time (year) of women from birth to the time of data collection. The data were collected by questionnaire. The measurement scale was continous, but for data analysis, it was

transformed into dichotomous, coded 0 for <20 or ≥ 35 years and 1 for 20 to 34 years.

Parity. Parity was defined as the number of children born to a woman either alive or not. The data were collected by questionnaire. The measurement scale was continous, but for data analysis, it was transformed into dichotomous, coded 0 for primiparous and 1 for multiparous.

Nutritional status. Nutritional status was calculated at the beginning of pregnancy or before pregnancy, calculated by body mass index (BMI). The measurement scale was 0 for obese and 1 for normal BMI.

Family history of hypertension. Family history of hypertension was defined as a women who had a history of hypertension from their biological parents or grandparents. The data were collected by questionnaire. The measurement scale was categorical, coded 0 for no and 1 for yes.

History of hypertension before pregnancy. History of hypertension before pregnancy was defined as pregnant women who have had hypertension before pregnancy. The data were collected by questionnaire. The measurement scale was categorical.

History of hormonal contraceptive. History of hormonal contraceptive was defined as the pregnant women who used hormonal contraception before pregnancy for at least 1 year. The data were collected by questionnaire. The measuring scale was categorical, coded 0 for no and 1 for yes.

Exposure to cigarette smoke. Exposure to cigarette smoke was defined as that non-smoking pregnant women got exposure to cigarette smoke during their daily lives both at home, work environment, and daily environment. The data were collected by questionnaire. The measurement scale was continous, but for the purposes of data analysis, it was transformed into dichotomous, coded 0 low exposure and 1 for high exposure.

e. Study Instruments

Blood pressure was measured by sphygmomanometer. The other variables were collected by questionnaire.

f. Data Analysis

Univariate analysis was done to describe and explain the characteristics of each variable based on the data that have been collected. Bivariate analysis was performed to determine the relationship between variables, namely hypertension in pregnancy with independent variables using the chi-square test. Multivariate data analysis used multilevel analysis to determine the influence of individual levels and the second level, posyandu against hypertension in pregnancy.

g. Research Ethics

Research ethics in this study included approval sheets, anonymity, confidentiality, and ethical feasibility. Research ethics was obtained from Research Ethics Committee Dr. Moewardi hospital, Surakarta, Central Java, with number: 409/III/HREC/2019.

RESULTS

1. Univariate Analysis

Table 1 showed sample characteristics (continous). A total of 210 pregnant women had an average age of 28 years with a minimum age of 18 years and a maximum age of 48 years, on average had parity 2 with a minimum of parity 1 and a maximum of 6, systolic blood pressure averaged 124.41 mmHg with a minimum value of 100 mmHg and a maximum of 210 mmHg, an average diastolic blood pressure of 81.65 mmHg, a minimum of 60 mmHg and a maximum of 150 mmHg, an average nutritional status of 24.40 with a minimum value of 16.44 and a maximum of 37.04, exposure to cigarette smoke with an

average of 1.73, value minimum 0 and maximum 4.

Table 2 showed that 71 pregnant women experienced hypertension (33.81%). 85 pregnant women were at age <20 years or ≥35 years old (40.48%). Primiparous mothers were 65 (30.95%). The number of women who were obese was 93 (44.29%). Pregnant womrn with a family history of hypertension were 98 (46.67%). A total of 64 pregnant women (30.48) experienced a history of hypertension before pregnancy. 73 pregnant women (34.76%) ever used hormonal contraception. 106 pregnant women (50.48%) exposed to high cigarette smoke.

Table 1. Sample characteristics (continous data)

Independent Variables	(n)	Mean	SD	Min.	Max.
Age (year)	210	28.83	6.95	18	48
Parity	210	2.01	0.91	1	6
Systolic Blood Pressure (mmHg)	210	124.41	18.84	100	210
Diastolic Blood Pressure (mmHg)	210	81.65	10.50	60	150
Nutritional Status (BMI)	210	24.40	3.61	16.44	37.04
Cigarette smoke exposure	210	1.73	1.42	0	4

Table 2. Sample characteristics (categorical data)

Characteristics	n	%
Hypertension		
No	139	66.19
Yes	71	33.81
Age		
20-35 years	125	59.52
<20 or ≥35 years	85	40.48
Parity		
Primiparous	65	30.95
Multiparous	145	69.05
Nutritional Status		
Normal (BMI <25 kgBW/m^2)	117	55.71
Obese (BMI ≥25 kgBW/m^2)	93	44.29
History of Family Hypertension		
No	112	53.33
Yes	98	46.67
History of Hypertension Before Pregnancy		
No (systolic blood pessure <140 mmHg)	146	69.52
yes (systolic blood pessure ≥140 mmHg)	64	30.48
History of Hormonal Contraception		
No	137	65.24
Ye	73	34.76
Cigarette smoke exposure		
Low (Score<2)	104	49.52
High (Score ≥2)	106	50.48

2. Bivariate Analysis

Bivariate analysis explained the effect of one independent variable on the dependent variable. The test in this study used the Chi-Square test. The independent variables included age, parity, blood pressure, nutritional status, family history of hypertension, history of hypertension before pregnancy, history of hormonal contraception, and exposure to cigarette smoke. The dependent variable was hypertension in pregnancy.

Table 3 showed that women with gestational age <20 years or ≥35 years (OR= 9.84; p<0.001), primiparous (OR= 0.34; p= 0.001), and nutritional status obesity (OR= 8.14; p <0.001) increased the risk of hypertension in pregnancy. Family history of hypertension (OR= 6.85; p <0.001) and history of hypertension before pregnancy (OR = 9.69; p <0.001) also had the possibility to increase the risk of hypertension in pregnancy. Women who had a hormonal contraceptive before pregnancy (OR = 4.14; p <0.001), and exposure to cigarette smoke (OR = 6.64; p <0.001) also could increase the risk of hypertension in pregnancy.

Table 3. The results of bivariate analysis

Independent Variables	Hypertension in Pregnancy				Total		OR	P
	No		Yes					
	N	%	N	%	N	%		
Age								
20-34 years	107	85.6	18	14.4	125	100	9.84	<0.001
<20 or ≥35 years	32	37.65	53	62.35	85	100		
Parity								
Primiparous	32	49.23	33	50.77	65	100	0.34	0.001
Multiparous	107	73.79	38	26.21	145	100		
Nutritional Status								
Normal (BMI <25 kgBW/m²)	100	85.47	17	14.53	117	100	8.14	<0.001
Obese (BMI ≥25 kgBW/m²)	39	41.94	54	58.06	93	100		
Family History of Hypertension								
No	95	84.82	17	15.18	112	100	6.85	<0.001
Yes	44	44.90	54	55.10	98	100		
History of Hypertension								
No (SBP <140 mmHg)	119	81.51	27	18.49	146	100	9.69	<0.001
Yes (SBP ≥140 mmHg)	20	31.25	44	68.75	64	100		
History of Hormonal Contraception								
No	106	77.37	31	22.63	137	100	4.14	<0.001
Yes	33	45.21	40	54.79	73	100		
Cigarette smoke exposure								
Low (Score<2)	89	85.58	15	14.42	104	100	6.64	<0.001
High (Score ≥2)	50	47.17	56	52.83	106	100		

SBP=Tekanan Darah Sistolik (Systolic Blood Pressure)

3. Multilevel Analysis

Table 4 showed the results of multivariate analysis. Pregnant women aged <20 years and ≥35 years were more likely to develop hypertension in pregnancy than women between 20 years and 35 years (b= 2.10; 95% CI= 0.16 to 4.04; p= 0.033). Multiparous women had a lower likelihood of experiencing hypertension in pregnancy than primiparous women (b= -3.81; 95% CI= -6.31 to -1.32; p= 0.003). Obese pregnant women had a higher risk of hypertension in pregnancy than women with normal body weight (b= 3.35; 95% CI= 1.36 to 5.33; p = 0.001).

Pregnant women who had a history of hypertension in their families had a higher risk for the incidence of hypertension in pregnancy than women without a history of hypertension in the family (b= 3.35; CI 95%= 1.3 to 5.37; p= 0.001).

Women who had a history of hypertension before pregnancy were more likely to experience hypertension in pregnancy than women who did not have a history of hypertension before pregnancy (b = 2.46; CI 95% = 1.1 to 3.81; p <0.001). Pregnant women who had a hormonal contraceptive before pregnancy were more likely to have hypertension in pregnancy than those without a hormonal contraception (b = 2.6; 95% CI = 0.53 to 4.72; p = 0.014).

Pregnant women exposed to high-intensity cigarette smoke were more likely to have hypertension in pregnancy than women with low-intensity exposure to cigarette smoke (b = 2.87; 95% CI = 1.15 to 4.58; p= 0.001). ICC= 7.6% indicates that posyandu had negligible effect on hypertension in pregnancy. Table 4 also showed the value of LR test vs. logistic regression p = 0.07 which means that the differences in the multilevel logistic regression analysis model with multiple logistic regression model were not statistically significant.

Table 4. The results of multilevel multiple logistic regression analysis

Independent Variables	b	CI 95%		p
		Lower Limit	Upper Limit	
Fixed Effect				
Age (<20 or >35 years)	2.10	0.16	4.04	0.033
Multiparous	-3.81	-6.31	-1.32	0.003
Nutritional status (Obese)	3.35	1.36	5.33	0.001
History of Family Hypertension (yes)	3.35	1.33	5.37	0.001
History of Hypertension Before Pregnancy	2.46	1.1	3.81	<0.001
History of Hormonal Contraception (yes)	2.6	0.53	4.72	0.014
High cigarette smoke exposure	2.87	1.15	4.58	0.001
Random Effect				
Posyandu var (constanta)	0.27	0.0001	713.90	
N Observation = 210				
N Posyandu = 26				
Log likelihood = -40.48				
LR test vs. Logistic Regression = 0.07				
ICC = 7.6%				

DISCUSSION

1. The effect of age on hypertension in pregnancy

The results of this study showed that there was a significant effect between age and hypertension in pregnancy. Age <20 years or ≥35 years old increased the risk of hypertension in pregnancy by 2.10 times higher than age 20 to 34 years old (b= 2.10; 95% CI= 0.16 to 4.04; p= 0.033). Sari (2019) stated that mothers aged <20 years or ≥35 years have a risk of 1.23 times greater risk of developing hypertension in pregnancy.

A study conducted by Kumari et al. (2016) explained that age affects the incidence of hypertension in pregnancy, ages below 20 years and over 30 years are more prone to developing hypertension in pregnancy because under 20 years of age can experience failure of normal trophoblast cells invasion leads to the adaptation of spiral arteriolar malls so that it can cause hypertension in pregnancy. Age >30 years increased the likelihood of preeclampsia.

2. The effect of parity on hypertension in pregnancy

The results of this study showed that there was a significant effect of parity on hypertension in pregnancy. Multiparous women had lower risk of hypertension in pregnancy

3.81 times than primiparous women (b= -3.81; 95% CI= -6.31 to -1.32; p= 0.003).

Umesawa and Kobashi (2016) reported that women with primipara had a higher risk of developing hypertension in pregnancy and preeclampsia. A study in China reported that primiparous women had a 1.5 times higher risk of hypertension in pregnancy compared to multiparous women.

A study by Radjamuda (2014) reported that women who had just become mothers had a risk of 6 to 8 times more susceptible to hypertension in pregnancy than multiparous. Immunological theory states that blocking antibodies to placental antigens formed in the first pregnancy are the cause of hypertension and can cause preeclampsia. The majority of women with first pregnancies at 28 to 32 weeks' gestation usually experience an increase in diastolic pressure of at least 20 mmHg which can lead to preeclampsia in pregnancy.

Other studies support that women who have never given birth have a 2-fold greater risk of occurrence of hypertension in pregnancy, due to initial trophoblast invasion and how the mother responds to it. Failure of normal trophoblast invasion leads to adaptation of spiral arteriolar males which is one of the causes of preeclampsia (Ramesh et al., 2014).

3. The effect of nutritional status on hypertension in pregnancy

The results showed that there was a significant effect of the nutritional status on the incidence of hypertension in pregnancy. Women who were obese before pregnancy might be able to increase the risk of hypertension in pregnancy 3.35 times compared to women with normal body weight (b= 3.35; 95% CI= 1.36 to 5.33; p= 0.001).

Istyanto et al. (2019) stated that there was a positive relationship between the incidence of hypertension and BMI. Gongora and Wenger (2015) also repoerted that the body mass index (BMI) of women before pregnancy was very influential on the incidence of hypertension in each trimester and had very strong risk factors for all forms of hypertensive disorders in pregnancy. Obese women had a 4.7 times higher risk of developing gestational hypertension and 2.5 times higher for preeclampsia compared to women who have normal body weight.

Weku et al., (2016) explained that pregnant women who had BMI ≥25 kgBW/m^2 at the beginning of pregnancy were at risk of experiencing pregnancy complications such as hypertension. Ayele et al., (2016) stated that BMI >30 kgBW/m^2 increased hypertension in pregnancy. The mechanism of obesity was one of the risk factors for the incidence of hypertension in pregnancy had not been explained in detail, but it was believed that obesity related to several events that caused hypertension in pregnancy including oxidative stress, dyslipidemia, insulin resistance, hyperinsulinemia, and impaired endothelium function.

One of the causes of hypertension in pregnancy is indicated by dyslipidemia which shows an ongoing process of atherosclerosis in early pregnancy and an increase in C-reactive protein involving inflammation (Shen et al., 2017).

4. The effect of family hypertension history on hypertension in pregnancy

The results of this study showed that there was a significant effect between family hypertension history on the incidence of hypertension in pregnancy. Women with a history of hypertension in the family were more likely to increase the risk of hypertension at 3.35 times compared to those without a family history of hypertension (b= 3.35; 95% CI = 1.33 to 5.37; p = 0.001).

The results of this study are in line with Sudaryanto et al., (2019), which states that women with a history of parents with hypertension can significantly influence the incidence of hypertension. Umesawa and Kobashi (2017) reported that a family history of hypertension had a risk of 3.17 higher risk of hypertension in pregnancy compared to not having a history of hypertension from his family. Sari et al. (2019) found that pregnant women with family history of hypertension had a risk of 0.60 times higher having hypertension in pregnancy.

5. The effect of history of hypertension on hypertension in pregnancy

The results showed that there was a significant effect between the history of hypertension before pregnancy on the incidence of hypertension in pregnancy. Women who had a history of hypertension before pregnancy can increase the risk of hypertension in pregnancy 2.46 times compared with those without a history of hypertension before pregnancy (b = 2.46; 95% CI = 1.1 to 3.81; p <0.001).

The results of this study are in line with Sari et al., (2019), that mothers with a history of hypertension before pregnancy can increase the likelihood of experiencing hypertension in pregnancy 1.54 times greater than not having a history of hypertension. The English et al. (2015) stated that women with a history of hypertension before pregnancy have risk factors for hypertension in their pregnancy (RR: 1.38, 95% CI: 1.01–1.87).

The results of the study by Umesawa and Kobashi (2017) supported that the history of hypertension from before pregnancy is one of the major risk factors in the incidence of hypertension in pregnancy. Women who had a history of hypertension since before pregnancy or chronic hypertension had 1.99 times higher hypertension in pregnancy. In addition, hypertension from previous pregnancies also had risk factors that can cause hypertension in pregnancy afterwards. A study in the United States shows that mild gestational hypertension, severe gestational hypertension and preeclampsia or eclampsia in the first pregnancy have a 3.0 times, 3.4 times and 6.3 times higher risk of experiencing hypertension in pregnancy in subsequent pregnancies.

6. The effect of hormonal contraception history on hypertension in pregnancy

The results showed that there was a significant influence between hormonal contraception history on the incidence of hypertension in pregnancy. Women who had a history of using hormonal contraception may be able to increase the risk of hypertension in a 2.6 times pregnancy compared to those without a hormonal contraception (b = 2.6; 95% CI = 0.53 to 4.72; p = 0.014).

The results of this study are in line with Azima and Mousavi (2017) revealing that women who use oral pill contraception for approximately a year can increase blood pressure. Oral contraceptive use can trigger hypertension because oral contraceptives can activate the renin-angiotensin system by increasing the regulation of intrarenal angiotensin-1 enzyme and angiotensin II type 1 receptors. In addition, oral contraceptive use can cause endothelial dysfunction by circulating circulating uric acid, damaging the pathway nephric oxide that is dependent on the endothelium and increases proinflammatory biomarkers such as plasminogen-145 activator inhibitors and C-reactive protein. Progesterone in oral contraceptives can increase P-aminopeptidase protein and mRNA expression. Increased P-aminopeptidase protein can break down bradykinin peptide vasodila-

tors and increase blood pressure (Liu et al, 2017).

7. The effect of cigarette smoke exposure on hypertension in pregnancy

The results showed that there was a significant effect between exposure to cigarette smoke on the incidence of hypertension in pregnancy. Women who were exposed to high-intensity cigarette smoke were able to increase their risk of hypertension at 2.87 times compared with those exposed to low-intensity cigarette smoke (b = 2.87; 95% CI = 1.15 to 4.58; p = 0.001).

The results of this study are in line with Tamura et al., (2018) that exposure to secondhand smoke in passive smoking is associated with an increase in prevalence in the general population in Japan. A Korean study concluded that passive smokers who are exposed to cigarette smoke every 2 hours per day or more can increase the prevalence of hypertension 1.5 times compared to women who are not exposed to cigarette smoke. Janah and Martini (2017) reported that exposure to secondhand smoke received by passive smokers for 5 minutes can cause changes in arteries and heart so that the longer a person is exposed to cigarette smoke can increase the risk of hypertension. Long-term carbon monoxide contained in cigarette smoke can directly play a role in arterial wall endothelial dysfunction and arterial stiffness that can be associated with an increase in blood pressure (Tamura et al, 2018).

8. The contextual effect of posyandu on hypertension in pregnancy

ICC= 7.6% means that posyandu had negligible contextual effect on hypertension in pregnancy. The variation in the incidence of hypertension in pregnancy was influenced by the contextual level was small and had a large influence from the individual level.

AUTHOR CONTRIBUTIONS

Erin Rizkiana, the main author played roles in collecting, and processing research data; Uki Retno Budihastuti, examined the conceptual framework and methodology; Vitri Widiastuti, reviewed the draft.

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CONFLICT OF INTEREST

There is no conflict of interest.

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