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Analysis of Factors Associated with the Incidence of Hypertension in Pregnancy: Study at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency

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Abstract

Hypertension is one of the diseases that often threatens pregnancy that occurs after 20 weeks of gestation. Tanah Bumbu is one of the regencies in South Kalimantan Province with 75 cases of maternal mortality rate (MMR) in 2022. To asses the relationship between maternal age, parity, body mass index (BMI), history of hypertension, and stress with the incidence of hypertension in pregnancy (HiP) in RSUD dr. H. Andi Abdurrahman Noor Tanah Bumbu Regency. This is an analytic observational study using a cross sectional approach with 85 samples using the purposive sampling technique. The research instruments were questionnaires. The dependent variable was: the incidence of HiP, while independent variables were: maternal age, parity, BMI, history of hypertension, and stress. Prevalence Odds Ratios (PORs) and 95% Confidence Intervals (95% CIs) were determined by using bivariate and multivariate analysis using binomial logistic regression tes. The results showed that there was an association between age (p=0.000), BMI (p=0.030), history of hypertension (p=0.000), and stress (p=0.000) and HiP, but not for parity (p=0.087). The stress was mostly associated with the incidence of HiP (Adj. OR= 1.964; 95% CI 2.816-79.516, p value=0.001). There was a relationship between maternal age, BMI, history of hypertension, and stress, but there was no relationship between parity and the incidence of HDK. The variable most associated with the incidence of HiP is stress.

Introduction

Hypertension is one of the cardiovascular diseases suffered by many people in the world so that it becomes a global problem. This condition can also affect pregnant women. According to data from the (Alatas, 2019) *World Health Organization* (WHO), hypertension in pregnant women is one of the causes of illness and death for both mother and fetus. Deaths of pregnant women caused by hypertension reached 12% in 2017 (WHO, 2018).

Indonesia ranks third highest for Maternal Mortality Rate (MMR) in Southeast Asia at 177 deaths per 100,000 Live Births (KH) after Myanmar and Laos. The average number of MMRs in Indonesia is 189 deaths per 100,000 KH. Indonesia is aggressively targeting a reduction in MMR to 70 per 100,000 KH by 2030. Meanwhile, based on the National Medium-Term Development Plan (RPJMN), Indonesia is targeted to reduce MMR to 183 deaths per 100,000 KH in 2024 (WHO, 2018; BPS, 2020). Data from the Indonesian Health Profile (2020) shows that HDK is classified as the 3 main causes of MMR after bleeding and infection. According to BKKBN (2021), the cause of MMR, namely HDK, is ranked first, before bleeding and other

complications of an obstetric and nonobstetric nature, infections and others. However, BKKBN data (2023) HDK is ranked 2nd in the occurrence of MMR after postpartum hemorrhage (BKKBN, 2023).

The picture of the increase in cases based on Basic Health Research Data (Riskesdas) in 2018, the prevalence of Hypertension in Pregnancy (HDK) was 8.31%, from the previous 25.8% (Riskesdas, 2013) to 34.11% (Riskesdas, 2018). Meanwhile, according to BKKBN (2021), the increase in MMR cases due to HDK in Indonesia was 59.69%, namely 1,077 deaths per 100,000 KH (BKKBN, 2021). South Kalimantan Province is ranked 13th out of 38 provinces in Indonesia with MMR of 224 deaths per 100,000 KH. The number of MMRs due to HDK in South Kalimantan Province in 2022 was obtained as many as 136 cases.

Tanah Bumbu is one of the districts in South Kalimantan Province with 75 cases of MMR. The main causes of AKI are HDK and postpartum hemorrhage. The local government hospital that is the referral center in Tanah Bumbu Regency and Kotabaru Regency is RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency. The three biggest causes of maternal death at RSUD dr.H. Andi Abdurrahman Noor are HDK which refers to pre-eclampsia or eclampsia around 67%, bleeding 21% and other complications of obstetric nature and infection 12%.

Hypertension in pregnancy is influenced by several factors which are known to increase the risk of pregnant women experiencing hypertension, such as maternal age, increased body mass index, stress, parity and history of hypertension. Based on this background, it is necessary to conduct research on the analysis of factors related to the incidence of HDK at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency.

Methods

This type of research is observational analytic with a cross-sectional *survey* approach with a sample of 85 respondents with *puposive sampling techniques.* This research was carried out in the working area of RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency. The research was conducted for 1 month. This research has obtained Ethical *Clearance*. Data collection is carried out directly to pregnant women. The independent variable values in this study were maternal age, amount of parity, body mass index (BMI), history of hypertension, and stress. The dependent variable in this study is the incidence of HDK Test used, namely logistic regression test at a confidence level of 95% (α= 0.05). The instrument used is the *Depression Anxiety Stress Scale 42* Questionnaire (DASS 42) adopted from Lovibond & Lovibond (1995).

Result and Discussion

Univariate Analysis Results

Table 1. Univariate analysis of HDK incidence variables based on maternal age, amount of parity, body mass index (BMI), history of hypertension, and stress

Characteristic	HDK Events		
	Total (n=85)	Usual (n=39)	HDK (n=46)
Age, n (%)			
Risky	35 (41,18)	6 (15,4)	29 (63,0)
No Risk	50 (58,82)	33 (84,6)	17 (37,0)
Parity, n (%)			
Risky	52 (61,18)	20 (51,3)	32 (69,6)
No Risk	33 (38,82)	19 (48,7)	14 (30,4)
BMI, (average ± sd)	23.26 ± 4.22	22.14 ± 3.5	24.20 ± 4.52
History of hypertension, n (%)			
Exist	32 (37,65)	4 (10,3)	28 (60,9)

None	53 (62,35)	35 (89,7)	18 (39,1)
Stress, n (%)			
Stress	33(38,82)	3 (7,7)	30 (65,2)
No Stress	52 (61,18)	36 (92,3)	16 (34,8)

Information: HDK = Hypertension in Pregnancy; BMI = Body Mass Index; *sd = standard deviation*

Based on table 1 shows the results of the relationship between the age of pregnant women with the incidence of HDK with a value of p = 0.000 (<0.05) with *crude* POR 9.382 (95%CI; 3.264–26.972). This means that H0 is rejected, which means that there is a significant relationship between maternal age and the incidence of HDK. The results of regression logistics analysis found a value of p = 0.087 (>0.05) Table 4.2 and *a crude* POR value of 2.717 (95%CI; 0.893–5.278) Thus, H0 is accepted, which means that there is no meaningful relationship between parity and HDK events.

The results of the analysis of the relationship between BMI variables and HDK events, namely using regression logistics, found the value of p = 0.030 (≤ 0.05) Table 4.2 and the value of *crude* POR was 1.137 (95%CI; 1.013-1.277). So, there is a significant relationship between BMI and the incidence of HDK. The results of the analysis of the relationship between the history of hypertension variables and the incidence of HDK were with a value of p = 0.000 (<0.05) with *crude* POR 13.611 (95%CI; 4.133 – 44.828). This means that H0 is rejected, which means that there is a significant association between a history of hypertension and the incidence of HDK. The results of the analysis of the relationship between stress variables and HDK events are p = 0.000 (<0.05) with *crude* OR 22.500 (95%CI; 5.981 – 84.640). This means that H0 is rejected, which means that there is a significant relationship between stress and HDK events.

Table 2. Bivariate and Multivariate

Variable	**HDK Events**		***Crude* POR (95%CI)**	***p-value***	***Adj.* POR (95%CI)**	***p-value***
	Usual (n=39)	**HDK (n=46)**				
Age, n (%)						
Risky	6 (15,4)	29 (63,0)	9,382 (3,264 – 26,972)	0,000*	10,895 (2,093 – 56,726)	0,005*
No Risk	33 (84,6)	17 (37,0)	1			
Parity, n (%)						
Risky	20 (51,3)	32 (69,6)	2,717 (0,893 – 5,278)	0,087	4,075 (0,852 – 19,500)	0,079
No Risk	19 (48,7)	14 (30,4)	1		1	
Average BMI ± to elementary school	22.14 ± 3.5	24.20 ±4,52	1,137 (1,013 –1,277)	0,030*	-1,087 (0,913 – 1,295)	-0,384
History of hypertension, n (%)						
Exist	4 (10,3)	28 (60,9)	13,611 (4,133 – 44,828)	0,000*	6,106 (1,13 – 26,380)	0,015*
None	35 (89,7)	18 (39,1)	1		1	
Stress, n (%)						
Stress	3 (7,7)	30 (65,2)	22,500 (5,981 – 84,640	0,000*	14,964 (2,816 – 79,516)	0,001*
No stress	36 (92,3)	16 (34,8)	1		1	

*Abbreviation: *Adj. = adjusted; CI = Confident interval*; HDK = hypertension in pregnancy; BMI = Body Mass Index; *POR = Prevalence Odds ratio*

Adjusted for age, parity, body mass index, history of hypertension, and stress

*Statistically significant (p<0.05)

Multivariate Analysis Results

The variable maternal age was included in the multivariate analysis which had a p value = 0.005 and an adj value. POR 10.895 (95%CI; 2.093–56.726). This means that mothers who are at risk age have a statistically significant relationship with the incidence of HDK which is 10,895 higher compared to pregnant women who are not at risk age.

The parity variable included in the multivariate analysis has a p value = 0.079 and an adj value. POR 4.075 (95%CI; 0.852–19.500). This means that parity of pregnant women is not statistically significantly related to the incidence of HDK.

The BMI variable was included in the multivariate analysis which had a p value = 0.384 and an adj value. POR 1.087 (95%CI; 0.913-1.295). This means that the incidence of HDK is statistically significantly related to the incidence of HDK.

The variable history of suffering from hypertension was included in the multivariate analysis which had a p value = 0.015 and an adj value. POR 6.106 (95%CI; 1.413–26.380). This means that pregnant women with a history of hypertension are at risk of having a statistically significant relationship with the incidence of HDK of 6.106 higher compared to pregnant women with no history of hypertension.

The stress variable included in the multivariate analysis has a p value = 0.001 and an adj value. POR 14.964 (95%CI; 2.816–75.516). This means that pregnant women with stress are statistically significantly related to the incidence of HDK which is 14,964 higher compared to pregnant women who do not have stress.

The relationship between the age of pregnant women and the incidence of HDK in pregnant women at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency

The results of statistical tests using *Binomial logistic regression* obtained a value of p = 0.000 (p < 0.05) so that H0 was rejected. This means that there is a relationship between maternal age and the incidence of HDK in pregnant women at RSUD dr.H. Andi Abdurrahman Noor, Tanah Bumbu Regency. The results of the study found that there were as many as 17 respondents with an age that was not at risk but had hypertension in pregnancy.

This is in line with the research of Imaroh et al. (2018) which states that there is a relationship between age and the incidence of HDK. Maternal age is one of the risk factors for hypertension. In the study of Imaroh et al. (2018) it was found that the age of mothers <20 years and >35 years was 4.9 times greater in influencing risk factors for hypertension (Imaroh et al., 2018).

The safe maternal age for pregnancy and childbirth is 20-30 years old. Maternal complications in pregnant women and giving birth at the age of under 20 years were 2-5 times higher than maternal deaths that occurred at the age of 20-29 years. The impact of less age can cause complications during pregnancy. Each adolescent primigravida has a greater risk of developing HDK and increases again at age over 35 years (Manuaba, 2018).

In the age range has a relationship with HDK in pregnant women because mothers who have the age of under 20 years are not used to providing food supply properly to the fetus, so they easily experience blood pressure and seizures more often. At the age of 20-35 years they are ready to get pregnant because they have completed the growth of their bodies. Pregnant women who have the age of more than 35 years will cause pregnancy and childbirth anxiety. In addition, their reproductive organs are also too old and prone to increased blood pressure (Yolanda, 2021).

The relationship between parity and HDK incidence in pregnant women at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency

The results of statistical tests using binomial logistic regression obtained a value of p=0.079 (p>0.05) so that H0 was accepted. This means that there is no statistically significant relationship between parity and the incidence of HDK in pregnant women at Dr.H Regional Hospital. Andi Abdurrahman Noor, Tanah Bumbu Regency.

This is in line with research by Marlina et al (2021) which states that there is no relationship between parity and the incidence of HDK. Because from the data we see that pregnant women with multiparous parity do not necessarily all suffer from hypertension. Likewise, it turns out that only a small percentage of pregnant women with grandemultiparous parity suffer from hypertension, and also a small percentage do not suffer from hypertension.

Repeated labor will have many risks for subsequent pregnancies. Parity 2-3 is the safest according to experts (Nurfatimah et al, 2020). This research is related to the immunological theory regarding the relationship between parity and the incidence of hypertension (pre-eclampsia-eclampsia). This theory states that blocking antibodies against placental antigens formed in the first pregnancy is the cause of hypertension and can lead to pregnancy poisoning. The majority of primigravidas from 28 to 32 weeks of pregnancy show an increase in diastolic pressure of at least 20 mmHg which can lead to pre-eclampsia in pregnancy (Radjamuda, 2014).

Based on the results of this study, it was concluded that there was no significant relationship between parity and HDK. However, the results of this analysis show that although the mean is not significant (p>0.05), the effect size found shows that risk parity is related to the incidence of HDK as much as 2.717 times higher compared to the group of pregnant women with risk-free parity. This is thought to be because the number of samples involved in this study was not too large, making it difficult to detect small relationships between variables that were statistically significant (Bakhriansyah et.al, 2022).

The relationship between BMI and the incidence of HDK in pregnant women at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency

The results of statistical tests using binomial logistic regression obtained a value of p=0.030 (p>0.05) so that H0 was rejected. This means that there is a relationship between BMI and the incidence of HDK in pregnant women studied at Dr.H Regional Hospital. Andi Abdurrahman Noor, Tanah Bumbu Regency.

This is in line with research conducted by Latipah et al (2023) which stated that BMI was the second dominant factor related to HDK (pre-eclampsia). This research shows that pregnant women who have a BMI in the obesity category have a 4 times higher risk of experiencing hypertension (pre-eclampsia) than pregnant women with other BMI categories.

The results of this study are also in accordance with the theory which states that blood pressure increases because the diameter of blood vessels decreases. This causes the heart's work to increase. One of the causes of this is deviant body proportions or obesity. This condition shows that there are fat deposits in the body which cause the diameter of the blood vessels to become narrow (Rakhmawati & Wulandari, 2021).

The relationship between a history of hypertension and the incidence of HDK in pregnant women at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency

The results of statistical tests using binomial logistic regression showed a value of p = 0.015 (p<0.05) so that H0 was rejected. This means that there is a relationship between a history of suffering from hypertension and the incidence of HDK in pregnant women at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency.

This is in line with research by Leda, et al (2022) which states that there is a relationship between a history of suffering from hypertension and the incidence of HDK. Women who experience hypertension (pre-eclampsia/-eclampsia) in their first pregnancy will increase their chances of getting hypertension (pre-eclampsia) in subsequent pregnancies. A pregnant woman has a greater risk of experiencing HDK if she has previously experienced HDK or has had hypertension for approximately 4 years. Women who have experienced HDK for the first time will experience hypertension in subsequent pregnancies (Ratumbuysang, 2014). A history of chronic hypertension during pregnancy can also increase the risk of HDK with complications resulting in the superimposition of preeclampsia and chronic hypertension in pregnancy (Marliana et al, 2021).

The relationship between stress and HDK incidence in pregnant women at RSUD dr.H. Andi Abdurrahman Noor, Tanah Bumbu Regency

The results of statistical tests using binomial logistic regression obtained a value of p=0.001 (p<0.05), so H0 was rejected. This means that there is a relationship between stress and the incidence of HDK in pregnant women studied at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency. The results of this study show that the number of pregnant women who experience pregnancy stress is greater than those who do not experience pregnancy stress. On average, respondents have conditions that always feel restless, irritable, have difficulty resting and have difficulty eating, which also affects the mother's own condition. The condition of pregnant women can cause intense emotions or stress to arise which will turn into a physical response which directly affects the circulatory system and affects the heart rate. However, there were also some respondents who did not experience pregnancy stress. This can be caused because they think that in previous pregnancies they always gave birth in safe conditions and the condition of health services close to home is also the reason why respondents feel safe (Ristiani & Sihaloho, 2024).

This is in line with research by Surianti et al (2021) which states that there is a relationship between stress and the incidence of HDK. Physiological reactions to stress can increase heart rate, circulatory tension, breathing and arrhythmias. Furthermore, the influx of chemical adrenaline due to extreme pressure will cause an increase in pulse rate (Manggoopa, 2017).

The relationship between age, parity, BMI, history of hypertension, and stress with the incidence of HDK in pregnant women at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency

In the multivariate analysis of all factors of hypertension incidence in pregnancy (age, parity, BMI, history of hypertension, and stress), the age variable that has a significance of p < 0.05 is (p = 0.005) with *adj. POR* is 10.895 (95%CI; 2.093 – 56, 267), a parity variable that has a significance of p>0.05 i.e. (p = 0.079) with *adj. POR* is 4.075 (95%CI; 0.852 – 19.500), a BMI variable that has a significance of p>0.05 (p=0.384) with adj. POR (95%CI; 1.087; 0.913 – 1.295), a variable history of hypertension that has a significance of P<0.05 ie (p = 0.015) with *ADJ. POR* is 6.106 (95%CI; 1.413 – 26.380), and stress variable has significance p<0.05 (p = 0.001) with *adj. POR* is 14.964 (95%CI; 2.816 – 79.516).

Stressful conditions increase the sympathetic nerves which then increase blood pressure gradually, meaning that the more severe the stressful condition, the higher the blood pressure. Stress is the fear and anxiety of a person's feelings and body regarding changes in the environment. If there is something that threatens physiologically, the brain's pituitary gland will send endocrine gland hormones into the blood. These hormones function to activate the hormones adrenaline and hydrocortisone, thus making the body able to adapt to the changes that occur (Hasan et al., 2018).

Based on research, it can be seen that the variable most related to the incidence of HDK in pregnant women at RSUD dr. H. Andi Abdurrahman Noor Tanah Bumbu Regency is stress which is followed by the variables age, history of hypertension and BMI.

Conclusion

Bivariate analysis has revealed a significant association between several factors and the incidence of hypertension in pregnancy (HDK) at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency. Of the variables studied, such as age, body mass index (BMI), history of hypertension, and stress, it seems that stress is the most dominant factor associated with the incidence of HDK. This finding shows the importance of psychosocial factors in influencing the health of pregnant women, in addition to physical factors such as age and BMI.

In addition to stress, other variables that have also been shown to have a significant relationship with the incidence of HDK are age, BMI, and history of hypertension. The age of pregnant women and BMI can be important indicators in evaluating the risk of HDK, because these two factors can affect the health condition of pregnant women directly. Meanwhile, a previous history of hypertension also has a significant contribution to HDK risk, highlighting the importance of comprehensive health monitoring for pregnant women with a history of chronic disease.

Therefore, in an effort to prevent and manage HDK at RSUD dr. H. Andi Abdurrahman Noor, Tanah Bumbu Regency, it is necessary to take a holistic approach that pays attention not only to physical factors such as age and BMI, but also psychosocial factors such as stress. Wellness programs that emphasize stress management and psychosocial support for pregnant women can be effective strategies in reducing the risk of HDK in the region.

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