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Impact of Sodium Intake, Stress and Obesity in Pregnant Mothers on Incidence of Hypertension in Pregnancy with Path Analysis

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KEYWORDS

hypertension in pregnancy, obesity, sodium nutritional intake, stress

ABSTRACT

The incidence of hypertension in pregnancy is influenced by several factors, including maternal age, sodium intake, primigravid stress, nulliparity, and increased body mass index (BMI)/obesity. This study aimed to analyze the effect of nutritional intake, sodium, stress, and obesity in pregnant women on the incidence of hypertension during pregnancy at the Kalitidu Bojonegoro Community Health Center. The research employed an observational cross-sectional method, examining the variables of nutritional intake, sodium, stress, and body obesity and their effect on pregnancy-related hypertension. The sample consisted of 86 pregnant women experiencing hypertension from a population of 109 at the Kalitidu Community Health Center during January-March 2023, selected through simple random sampling. Data collection instruments included questionnaires and maternal cohort registers. Data analysis was performed using inferential statistics, specifically chi-square and path analysis using PLS. Path analysis results indicated significant effects of three variables, with sodium nutrient intake (X1) showing a significance value of 0.000. The combined contribution of the variables X1, X2, and X3 explained 75.9% of the variance in pregnancy-induced hypertension, while the remaining 24.1% was attributed to other unstudied factors. The residual value (e2) was calculated as $\sqrt{(1-0.759)} = 0.4909$. In conclusion, sodium nutrient intake, stress, and obesity in pregnant women are associated with the incidence of hypertension during pregnancy at the Kalitidu Community Health Center. Health workers are encouraged to provide health education on balanced nutrition during pregnancy and psychological support to manage maternal stress, ultimately promoting the health of both mothers and fetuses.

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INTRODUCTION

The World Health Organization (WHO) estimates that 800 women die every day from complications of pregnancy and childbirth (Organization, 2018). About 99% of all maternal deaths occur in developing countries. Approximately 80% of maternal deaths are the result of increased complications during pregnancy, childbirth and post-partum. The main complications that cause almost 75% of all maternal mortality are severe bleeding (mostly postpartum bleeding, infections (usually postpartum), and high blood pressure during pregnantness. The rate of hypertension continues to rise dramatically; almost 8% of women of reproductive age (22–44 years) are affected by hypertension in the USA. The incidence of hypertension prior to pregnancy among 15 54-year-old women increased 2-fold from 1993 to 2002 (from 12.3 to 28.9 per 1000 deliveries). Pregnancy-associated hypertension remains an important cause of maternal and fetal morbidity and mortality, and more evidence has confirmed that pregnancy-associated hypertension could cause early childhood cardio-metabolic disorder (Lu et al., 2018). Hypertension is one of the most common health problems during pregnancy and can cause complications in 2-3% of pregnancies.

The maternal mortality rate (MMR) is a measure of the degree of public health that is useful to describe the nutritional and health status of the mother, the environmental conditions and the level of

health care (Yakubu et al., 2018). MMR access in the Bojonegoro district has increased sharply in the last 2 years; by 2020, MMR will be 161.80 per 100,000 live births, and by 2021, it will reach 200.30 per 100,000 live births. In Bojonegaoro District, the cause of maternal death in 2021 is mainly caused by other causes, i.e. 66.67% (22 cases) and bleeding (15.15%) or 5 cases, milieus by hypertension in pregnancy by 9.09% (3 cases), and circulatory disorders 9,09% (3 cases) (Pusporini et al., 2021). According to Mom and Children's Health Rapport Kalitidu Public Health Center report in 2021, there were 23 cases of Hypertension in Pregnancy (6.91%) of 333 pregnant mothers, this case is higher than the district where in 2021, there were 199 cases of hypertension of pregnancy (1,32%) of 16.934 pregnant women so that the cases of hypotension in pregnancies in Puskésmas Kalinidu is the highest in Bojonegoro district and the gap with the districts has increased by 5,59%. Hypertensive pregnancy According to the International Society for the Study of Hypertension in Pregnancy (ISSHP), there are 4 categories of hypersensitivity in pregnantness, namely preeclampsia-eclampsia, gestational hypertensive, chronic hypertension, and superimposed preeclampsia chronic hypertension (Amjad et al., 2024). Early excessive maternal weight gain and initial BMI are independently associated with the diagnosis of a hypertensive disorder of pregnancy. Women should be counseled regarding the benefits of achieving a normal BMI prior to pregnancy and appropriate weight gain during pregnancy, as well as the potential harms of excessive weight gain related to perinatal outcomes (Ruhstaller et al., 2016).

The occurrence of hypertension in pregnancy can be influenced by several factors (multiple causation). Mother's age (<20 or >=35). Primigravidity, nulliparity and increased body time index (BMI) are predisposing factors for hypertension during pregnancy (Prasetyo, 2006), (Amjad et al., 2024). In the study pregnant mothers with excessive sodium intake have a risk of preeclampsia of 2.54 times compared to those with sufficient sodium. Excessive atrium intake will cause fluid retention that will increase blood volume so that pregnant women have vasospasms, which causes the heart to pump harder to push blood volume through narrower spaces, which causes blood pressure to rise and hypertension in pregnant mothers. Found that pregnant women with anxiety have a 6.5 times higher risk of developing preeclampsia than women who do not have anxieties (Hoyer et al., 2020). Occurrences of hypertension in pregnant mothers in the work area of Puskesmas Padang Panyang district Kuala Pesisir are caused by historical factors of high blood pressure, obesity and coffee drinking habits. In the highest rate of hypertension in overweight/obese women with HDP than in their non-overweight/obese counterparts in all age groups. (30s: 27.17 vs. 2.22; 70s: 4.75 vs. 1.90). In conclusion, the link between HDP and hypertension was then stronger in young women and in obese women in the 30-70-year-old age group (Wagata et al., 2020).

One study showed a correlation between high sodium intake and high blood pressure, but it also found that high levels of sodium do not increase blood pressure in everyone. Individual sensitivity to low salt intake varies by genetic factors and age (Febriana et al., 2017). According to a study conducted by Riise dkk in 2017, pregnant women who suffer from hypertension during pregnancy have a higher risk of developing cardiovascular diseases in the future, such as coronary heart disease and heart failure. In connection with some studies of maternal deaths due to hypertension during pregnancy, preeclampsia or eclampsia are caused by several risk factors such as the mother's age, parity, distances between pregnancies, multiple pregnancies, history of preeclampsia, hereditary history, a history of previous diseases such as diabetes mellitus, high blood pressure and kidney disease as well as several other factors including socio-economic status, ANC history, anxiety and nutrients consumed, so the researchers restricted the scope of research on the impact of sodium intake, stress and obesity in pregnant mothers on the occurrence of hypertensive disease in pregnancy with the path of analysis in the postpartum Bojonegoro disease. Research Benefits for Government As input material for all policymakers and related agencies to prioritize health programs in efforts to lower maternal mortality

rate {MMR}, as information material to improve health services in the implementation of hypertension in pregnant mothers as well as providing information about benefits for health services as also as a reference for health in providing health education, For future researchers as a source of reference and aspiration in conducting further research and can add more insight and knowledge about the factors (pregnancy, double pregnancies, mother's age, family history, pre-pregnant diseases) that affect the occurrence of high blood pressure in the pregnant women in the city of Bojonegoro.

METHOD

The type of research used is analytical research with a cross-sectional approach. The study design aims to analyze the independent variables—sodium intake, stress, and obesity—and their relationship to the dependent variable, pregnancy hypertension, at Kalitidu Bojonegoro Public Health Centre. The research population includes all pregnant women at the health center from January to March 2023, totaling 109 individuals. The sample size is determined using the Slovin formula n=1+N(e)2N, where N=109N = 109N=109 and the margin of error e=0.05, resulting in a sample size of 86 pregnant women.

Participants are selected based on inclusion and exclusion criteria. Ethical approval was obtained from the relevant ethics committee, and informed consent was secured from all participants prior to data collection. The independent variables measured include sodium intake (more than 1500 mg = high, 1500 mg = adequate), assessed using the 2x24-hour Food Recall method; stress levels (stress score: 15-42, no stress: 0-14), measured using the DASS (Depression Anxiety Stress Scale); and obesity status (obesity: BMI ≥ 27 kg/m², no obesity: BMI < 27 kg/m²). The dependent variable is pregnancy hypertension, classified as hypertension (SBP ≥ 150 mmHg, DBP > 90 mmHg) or no hypertension (SBP < 150 mmHg).

RESULT AND DISCUSSION

Characteristics of Pregnant Mothers

Table l. Distribution of Pregnant Mothers Frequency based on Characteristics (age, education, work, parity, work history) in the Health Centre of Kalitidu District of Bojonegoro in 2023

Mother Characteristics	Frequency	Percentage (%)
Age		
<20	0	0,00
20 -35	78	91,70
>35	8	9,30
Education		
Primary School	1	1,16
Yunior High School	2	2,33
Senior High School	59	68,80
Bachelor	24	27,91
Job		
Housewives	49	56,97
Private	35	40,70
Civil Servants	2	2,33
Parity		
Nulipara	49	56,98
Primipara	32	37,21
Multipara	5	5,81
Hypertension history		
Yes	51	59,30
No	35	40,70

Table 1 shows that of the 86 respondents, the majority were in the age range of 20-35 years (91.70%). For educational status, the majority of respondents were Senior high school educated (68.80%). For employment, the vast majority were Housewives (56.98%), and the least worked as civil servants (2.33%). For the history of hypertension, most respondents have a history of high blood pressure (59.30%).

Nutritional Data of Sodium, Stress, Obesity and Incidence of Hypertension in Pregnancy in Pregnant Mothers

Table 2. Variable Frequency Distribution Research of Pregnant Mother Factors Based on Nutritional Ingestion of Sodium, Stress, Obesity and Incidence of Hypertension in Pregnancy at the Kalitidu Public Health Center in Bojonegoro District in 2023

Variable Research of Pregnant Mother Factor	Frequency	Percentage
Sodium intake		
More (>1500 mg)	19	22,09
Enough (= 1500 mg)	67	77,91
Stress		
Stress (score 15-42)	13	15,12
No Stresss (score 0-14)	73	84,88
Obesity		
Obesity (IMT =27 kg/m2)	29	33,72
Non obesities (IMT<= 27 kg/m2)	57	66,28
Incidence of hypertension in pregnancy		
Pregnancy Hypertension (S >=150 mm Hg, D >90 mmHg)	12	13,95
No Pregnancy Hypertension (S<150 mm Hg, D<90 mm Hg)	74	86,05

Table 2 shows that of the 86 respondents, the majority of respondents with a sufficient sodium nutrient intake were 67 (77.91%); for stress, The majority of respondents were 13 (15.12%), and most pregnant mothers did not Stress as much as 73 (84.88%). For obesity, most of the respondents weren't obese, 57 (66.28%). And for pregnancy hypertension, most respondents did not Hypertension in pregnancies was 74 (86.05%).

Table 3. Variable Frequency Distribution Research of Pregnant Mother Factors Relationship of Nutrient Ingestion of Sodium, Stress, Obesity with Occurrence of Hypertension in Pregnancy at Kalitidu Public Health Center in Bojonegoro District 2023

Sodium intake	**Incidence of hypertension in pregnancy (IHP)**				Total i		P iValue
	Pregnancy Hypertension		**No Pregnancy Hypertension**				
	n	%	n	%	n	%	
More	I12	63,20	7	36,8	19	100	
Enough	0	0,00	67	100,0	67	100	0,000
Total i	12	14,00	74	86,0	100	100	C=0,584
Stress							
Stress	I10	76,9	3	23,1	13	100	
No Stress i	2	2,7	71	97,3	73	100	0,000
Total i	12	14,00	74	86,0	86	100	C=0,609
Obesity							
Obesity	I8	27,6	21	72,4	29	100	
No Obesity	4	7,0	53	93,0	57	100	0,018

Sodium intake	Incidence of hypertension in pregnancy (IHP)				Total i		P iValue
	Pregnancy Hypertension		No Pregnancy Hypertension				
	n	%	n	%	n	%	
Total i	12	14,00	74	86,0	86	100	C=0,27

Based on table 3 shows that pregnant women with intake of sodium nutrients over 63.2%. Statistic test results Chi Square 0,000 < α (0,05) with the value of Contingent Coefficient I = 0,603, so H0 rejected, which means there is an influence of ingestion of nutrients sodium pregnant mothers with the incidence of hypertension in pregnancy at the Kalitidu Public Crime Centre with a strong relationship turnover rate. For the stress variable pregnancies with stress, 76.9% have Hypertension During Pregnancy. For the obesity variable, the Tatistical test results obtained 0,000< α (0.05) with a value of contingent coefficients I = 0.609, so H0, which means that there is the stress of pregnant mothers with the occurrence of hypertension in pregnantness at the Calitidu Social Crime Center with a high level of contact turnover. Chi-Square statistical test results obtained 0,018<α (0,05) with Contingent Coefficient I = 0,27, so H0 was rejected, which means there was an influence of obesity of pregnant mothers with the incidence of hypertension in pregnancy at the Kalitidu community crime centre with a low relationship turnover rate.

Path Analysis

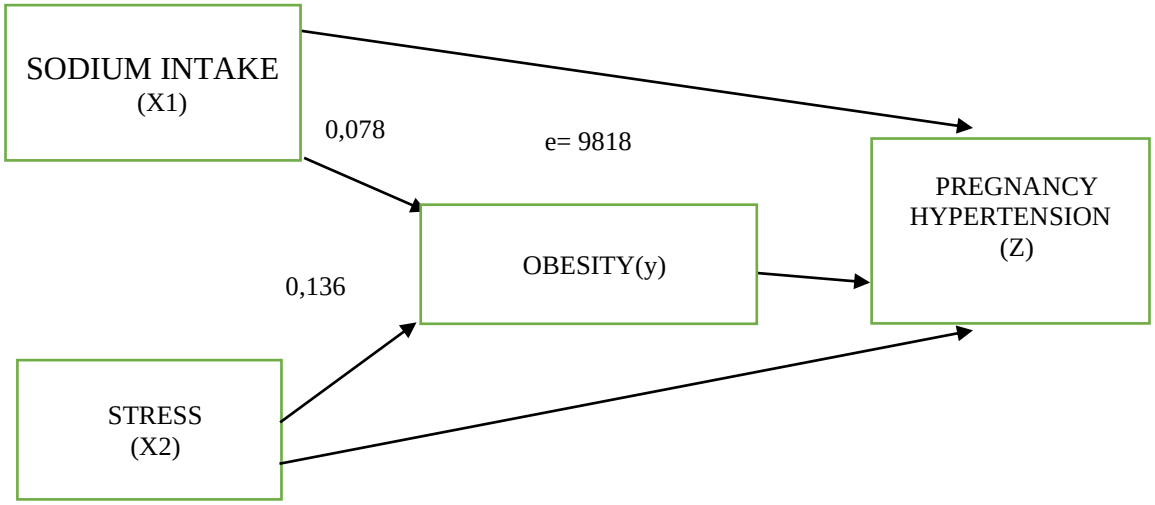

Figure 1. Path Analysis Coefficient Path Model Impact of Nutritional Substances Sodium, Stress and Obesity In Pregnant Mothers Against Pregnancy Hypertension In Kalitidu Bojonegoro Health Center.

Model I Track Coefficient

Table 4. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	SE	Beta		
(Constant)	1.173	.281		4.167	.000
Sodium Intake	.089	.148	.078	.599	.551
Stress	.180	.171	.136	1.050	.297

a. Dependent Variable: Obesity

Referring to the Regression Output Model I, in the coefficients section of the table, it can be seen that the significant values of the two variables are X1 (Nutrient intake of sodium= 0.551 and X2 (Stress)= 0.297 greater than 0.005. This results in the conclusion that Model I regression, namely variables X1 and X2, have no influence on Y (Obesitas). The size of the R2 or R Square value found in the Model Summary table is 0.036, which indicates that the contribution or contribution of influence of X1 and X2 on Y is 3%, while the value of e1 can be searched with the formula e1= V (1-0.036) = 0.9818.

Model II Track Coefficient

Table 5. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.871[a]	.759	.750	.174

a. Predictors: (Constant), Obesitas, Asupan Zat Gizi Natrium, Stress

Table 6. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	SE	Beta		
(Constant)	.151	.114		1.327	.188
Sodium Intake	.390	.055	.467	7.140	.000
Stress	.469	.064	.484	7.368	.000
Obesiity	.089	.040	.122	2.205	.030

Based on the Model II Regression Output, in the coefficients section of the table, it is known that the significant values of the three variables are X1 (Nutrient Sodium intake = 0,000 and X2 (Stress) = 0, 000 and Y (Obesity) = 0.030 smaller than 0.005. These results give the conclusion that Model II regression, namely variables X1, X2 and Y, influence Z. (Kejadian Hipertensi Dalam Kehamilan). The magnitude of the R2 or R Square value found in the Summary Model table is 0.759, which indicates that the contribution or contribution of the influences of X1, X2 and Y on Z is 75.9%, while the remaining 24.1% are contributions of other variable variables that have not been studied. While for the value e2=V(1-0,759) = 0,4909.

Thus the path diagram of model structure II is as follows:

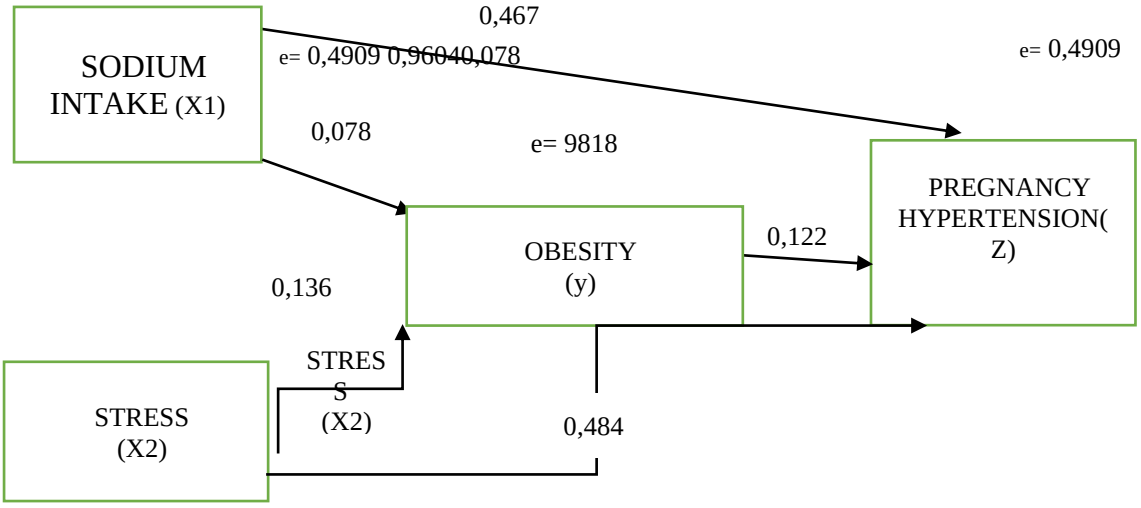

Figure 2. Path Analysis Coefficient Model II Path Effects of Nutritional Substances Consumption of Sodium, Stress and Obesity in Pregnant Mothers against Pregnancy Hypertension In the Health Center of Kalitidu Bojonegoro as follows:

Pregnant Mother's Nutritional Sodium Intake at Kalitidu Public Health Center

Based on the results of the study, the majority, or 77.91%, of pregnant women had sufficient sodium intake, and a small proportion, of 22.09%, had more sodium. Sodium is the primary cation in extracellular fluids. 35-40% of the sodium is in the body. The main source of sodium is kitchen salt or NaCl. The kitchen salt in daily food serves as a spice and as a preservative. The recommended sodium intake for women aged 19-29 is 1,500 mg/day, and for 30-49 years of age, 1,500mg/day. In pregnant mothers, there is no extra sodium intake (Masrochah et al., 2021). A lot of sodium is derived from sodium chloride (cooking salt), which is used as a flavoring agent in cooking and cooking, in addition to food preservation such as cheese, smoked tongue, salted fish, shrimp, and vegetables. In general, animal foods such as milk, cheese, eggs, meat, and fish contain more sodium than vegetables such as vegetables and cereals. Na/K ratio has been highlighted to be predicted as a risk factor for home hypertension (Mogi et al., 2022).

In this study, most respondents had a sufficient sodium intake of 1500 mg/day. Based on a 2x24-hour food recall, respondents rarely consume junk foods or pot foods that are high in sodium, consume more vegetables and fruits, and consume low-sodium traditional foods. Fruits such as melons, bananas, and strawberries and vegetables such as carrots, spices, and taught have low sodium levels, while traditional dishes with simple processes such as lemon, apex, mud cakes, and onde-onde have almost no sodium value. Proteins like tempe, chicken, meat, and fried eggs do not have too high sodium values. Some respondents consumed high-sodium processed foods such as instant meat, bakso, chicken, and Kentucky chicken, but only in rare periods of time.

The Stress of Pregnant Mother at Kalitidu Public Health Center

According to the results of the study, 84.88% of pregnant women experience non-stress, and partially or 15.12% of women experience Stress as an emotional state and is characterized by feelings of tension, thoughts that make the individual feel anxious and accompanied by physical responses such as heartbeats, rising blood pressure, and so on. The symptoms of the stresses of pregnant mothers are seen as aggression, difficulties in socializing and communicating, difficulty sleeping, severe palpitations or heartbeats, frequent urination, abdominal pain, sweating and trembling hands, tenderness

of feet and hands, muscle cramps, frequent dizziness, and fainting. Oxidative stress plays a central role in the pathogenesis and pathophysiology of hypertensive disorders of pregnancy (Phoswa & Khaliq, 2021a). Clear evidence indicates its involvement in the initiation and progression of these disorders. Therefore, factors that lead to the production of ROS (antithrombin-1 and TNF-α) should be further investigated and may be used as potential biomarkers for the early detection of oxidative stress in pregnancy (Phoswa & Khaliq, 2021b).

In this study, some respondents experienced stress. Based on the DASS Stress questionnaire, the highest scores of respondents were on statements 1 and 8. Statement 1 relates to feelings of anxiety, bad expectations, fear of one's own thoughts, and vulnerability. Stress in pregnancy is related to the state of well-being of her and the baby to be born, feeling safe and comfortable during pregnancy, preparation for parenting, attitude to accept pregnancies, family finances, and family support, whereas statement 8 on Difficulty to rest, difficulty sleeping in pregnant trimester 1 is due to increased levels of progesterone hormone which naturally interferes with sleep time. In addition, changes in levels of this hormone will also drive the pregnant mother's desire to sleep longer and cause difficulty in sleeping at night (Kloss et al., 2015). In the third trimester, due to pain and back pain, frequent foot cramps, frequent urination, depression, and anxiety that trigger insomnia.

Obesity Pregnant Mother at Kalitidu Public Health Center

According to the study, 66.28% of pregnant women do not have obesity, and 33.72% of pregnant mothers do not. Obesity is a multifactorial disease caused by excessive accumulation of fat in the body, which can affect the health of an individual. When a person gains weight, the size of the fat cells increases, and the number of fats increases. The Body Mass Index (BMI) is an anthropometric measurement that measures the ratio of body weight and height to assess nutritional status.

In this study, an increase in IMT was closely linked to the occurrence of mild hypertension and/or preeclampsia. From the results of previous studies in 2010 on primigravids, significant results were obtained between obesity and the incidence of hypertension in pregnancy. High IMT values are associated with dyslipidemia, which will increase serum/plasma triglycerides and LDL (Low-Density Lipoprotein) and decrease VLDL (Very Low-Density Lipoprotein). This condition will induce oxidative stress and cause dysfunction of the endhotel system, which is the basic concept of the cause of hypertension in pregnancy. (Ibrahim 2010, Tsania 2010)

The prevalence of hypertension during pregnancy at the Kalitidu Public Health Centre

Based on the results of the study, it is known that a small proportion or 3.95%, of pregnant women have a blood pressure of 140/90 mmHg or more after 20 weeks of pregnancies in women who have previously been normotensive, or a rise in systolic pressure of 30 mm Hg and/or diastolic pressure 15 mmHg above normal values.

There are several types of hypertension in pregnancy. namely, Chronic Hypertension, Preeclampsia, and Preeclampsia superimposed upon chronic hypertension. From the data, the researchers assumed that hypertension during pregnancy that occurred in respondents meant that respondents experienced an elevation in systolic blood pressure ≥ 140 mmHg or diastolic ≥ 90 mm Hg, which could lead to a risk of pregnancies. According to the theory that preeclampsia is established on the basis of the onset of hypertension (a rise in systolic blood pressure ≥ 140 mmHg or diastolic ≥ 90mmHg) accompanied by proteinuria (proteinuria excretion ≥ 300 mg protein in urine for 24 hours or dipstick examination ≥ 1+) suggests that in Puskesmas Kalitidu there are still pregnant mothers with preeclampsia. It's because of another factor: the first pregnancy. When you're pregnant for the first time, your body forms a protein (HLA-G) that plays an important role in modulating the immune response, so you reject the conception (placenta), or you have intolerance to the placenta, so that's what triggers preeclampsia. Preeclampsia can be detrimental to both the mother and the conceived fetus.

Complications in the mother include HELLP syndrome (hemolysis, elevated liver enzyme, low platelet), lung edema, kidney failure, bleeding, placenta solution and even mother's death. Complications in babies can be premature birth, fatigue, low birth weight or intra-uterine fetal death. (IUFD).

Relationship of Pregnant Mother's Nutritional Sodium Intake with Pregnancy Hypertension in Kalitidu Bojonegoro Public Health Center

The study found that out of 19 pregnant women with excess sodium intake, 12 (63.2%) had hypertension during pregnancy, and 7 (36.8%) did not have hypertensive pregnancies, while 67 pregnant mothers with adequate sodium consumption did not develop hypertensive pregnancies and 67 (100%) didn't have hypotension during the pregnancy. From both variables, after statistical testing using Fisher's Exact obtained a P-value significance value (0,000) < α (0,05) with a Coefficient Contingent (C) value = 0, 584, so H0 was rejected, which means there was a relationship between the intake of nutrient sodium of pregnant mothers and the occurrence of hypertension in pregnancy in Puskesmas Kalitidu, with a strong link turn rate.

A balanced intake of nutrients during pregnancy can also determine the health status of the pregnant woman (Ho et al., 2016). Sodium mineral intake, which is a macro mineral, has a close relationship with various body tissue functions. Sodium has the ability to store fluids. Sodium balance during pregnancy is necessary to prevent the accumulation of sodium by the mother and fetus as well as to reduce the risk of pregnancy hypertension. High sodium intake is a trigger for hypertension. Excessive sodium intake will lead to fluid retention that will increase blood volume so that the pregnant mother has vasospasm, which causes the heart to pump harder to push blood volume through narrower spaces, which causes blood pressure to rise and hypertension to occur. Na/K ratio has been highlighted to be predicted as a risk factor for home hypertension (Mogi et al., 2022). The impact of the overall risk factors, including the urinary Na/K ratio and sleep efficiency, on home hypertension was higher than that of conventional risk factors alone. The management of the urinary Na/K ratio and sleep efficiency, as well as conventional risk factors, might be important in the management of blood pressure (Hirata et al., 2021).

According to the researchers, sodium intake was linked to the occurrence of preeclampsia. Based on a 2x24-hour recall of 46 pregnant mothers, it was found that some respondents prefer market-selling foods such as apex, lemon, and onde-onde and rarely eat light snacks such as chili. Using instant spices such as cheese, bottled sauce, condiments, and instant meat is a high sodium content food ingredient. This is reinforced by the Chi-Square test has an analysis of the value $\rho = 0.014 < \alpha\ 0.05$, which proves that there is an influence between the independent variable (sodium consumption pole) and the dependent variable (preeclampsia pregnant mother) with OR=6,314. The results of this study are consistent with the result of sodium intake associated significantly with blood pressure p=0,001(p<0,05) and r=0,687. Mothers with excessive sodium intake have a 2.54 times higher risk of developing preeclampsia than mothers who have sufficient sodium. Excess sodium intake will cause fluid retention, which will increase blood volume. Excessive sodium consumption can shrink the diameter of the arteries, causing the heart to pump harder to push blood volume through narrower spaces, which causes blood pressure to rise.

Pregnant Mother Stress Relationship with Pregnancy Hypertension In Kalitidu Public Health Center

According to the results of the study, out of 13 pregnant women who were stressed, 10 people (76.9%) had hypertension during pregnancy, and 3 people (23.1%) did not have high blood pressure during pregnantness, while 73 pregnant mothers were not stressed 2 people (2.7%) of them had high blood pressure in pregnant and 71 people (97.3%) had no hypertensive blood pressure at pregnant. From

these two variables, after testing statistics using Chi-Square obtained a P-Value value (0,000) < α (0.05) with a Contingent Coefficient (C) value of 0.609, so H0 was rejected, which means H1 was accepted, so there was a relationship between the stress of pregnant mother and the occurrence of high blood pressure in pregnancies in Puskes Kmasalitidu, with a strong relationship twist rate.

Stress is a mental element that describes the feelings and emotional states that a person has when faced with reality or events in his life (Levi, 2016). Pregnant mothers who experience anxiety and stress can cause their blood pressure to rise. Oxidative stress plays a central role in the pathogenesis and pathophysiology of hypertensive disorders of pregnancy. Clear evidence indicates its involvement in the initiation and progression of these disorders. Therefore, factors that lead to the production of ROS (antithrombin-1 and TNF-α) should be further investigated and may be used as potential biomarkers for the early detection of oxidative stress in pregnancy (Phoswa & Khaliq, 2021b).

According to researchers, stress is linked to hypertension during pregnancy; pregnant mothers experience physical and psychological changes, one of which is stress. Anxiety about the health of the conceived fetus, the nutritional adequacy of the mother and the foetus, anxieties about the forthcoming delivery, whether a mother can play a role as a good parent for her child and how her husband and family behave during pregnancy. This was reinforced by reporting that prenatal depression and anxiety are associated with vasoactive hormone or other neuroendocrine excretion, which in turn increases the risk of hypertension; it also triggers vascular changes and increased uterine artery resistance, the same as occurs in the case of preeclampsia. This is in line with a study conducted entitled "The Anxiety Rate of Pregnant Mothers with Preeclampsia In a Hospital In Lampung Province", showing that there is a relationship between the anxiety rate of pregnant mothers and preeclampsia occurrences obtained OR=7.84; (CI=3.967–15.501); p=0.00. The interpretation is that the incidence of preeclampsia in pregnant mothers is 7.84 times higher in mothers with anxiety compared to mothers who do not. Pregnant mothers who experience anxiety and stress can cause high blood pressure or preeclampsia. Preeclampsia can cause disorders to both the mother and the fetus; for the pregnant mother, it causes seizures, coma, and even death, whereas, for the fetus, it causes premature birth of fetal death material in the womb. The role of the family when you're pregnant is very important. The family also plays a role in reducing the anxiety of pregnant mothers by accompanying the mother in doing the ANC exam, giving the mother moral support, and continuing to motivate the mother so that she feels more confident and calm in the face of pregnancy and childbirth.

Relationship of pregnant women's obesity with pregnancy hypertension at the Kalitidu Public Health Center

According to the results of the study, out of 29 pregnant women who are Obese, 8 people (27.6%) had hypertension during pregnancy, and 3 people (72.4%) did not have hypertensive during pregnancy, while 57 pregnant mothers were not obese, 4 people (7.0%) of them had high blood pressure while pregnant and 53 people (93%) didn't have high blood pressure when pregnant. From these two variables, after testing statistics using Chi-Square obtained P Value value (0.018) < α (0.05) with the value of Contingent Coefficient (C) = 0.27, so H0 was rejected, which means H1 was accepted, so there was a relationship between pregnant woman's obesity and the occurrence of hypertensive during pregnantness in Puskesmas Kalitidu, with the rate of the relationship twist of obesities.

Obesity is a multifactorial disease caused by excessive accumulation of fat in the body, which can affect the health of an individual. When a person gains weight, the size of the fat cells increases, and the number of fats increases. The Body Mass Index (BMI) is an anthropometric measurement with the ratio of body weight and height for assessing nutritional status. The baseline BMI is associated with future risk for incident hypertension even after accounting for weight change during the follow-up period. Weight loss may be recommended for non-hypertensive obese adults to prevent the development

of hypertension. Inifluence of excessive pre-pregnancy maternal weight on the risk of pregnancy complications such as diabetes and hypertension, which can impact fetal outcomes (Lewandowska et al., 2020). Our findings provided direct evidence that obesity was causally associated with a higher risk of hypertension disorders in pregnancy. Taking measures to reduce the proportion of obesity may help reduce the incidence of hypertension disorders in pregnancy (Wang et al., 2022).

In this study, an increase in IMT was closely linked to the occurrence of mild hypertension and/or preeclampsia. From the results of previous studies in 2010 on primigravids, significant results were obtained between obesity and the incidence of hypertension in pregnancy. The increase in IMT is associated with dyslipidemia, which will increase serum/plasma triglycerides, LDL (Low-Density Lipoprotein) and VLDL (Very Low-Density Lipoprotein). This condition will induce oxidative stress and cause dysfunction of the endhotel system, which is the basic concept of the cause of hypertension in pregnancy. (Ibrahim 2010, Tsania 2010) (Amjad et al., 2024)

CONCLUSION

For pregnant mothers, it is essential to seek regular consultations and health checks at healthcare centers as part of preparation for childbirth and to prevent high-risk pregnancies. Routine antenatal care should be conducted at health facilities to monitor maternal and fetal health, enabling early detection of pregnancy complications. For healthcare providers, particularly midwives, continuous efforts should be made to enhance health education for pregnant mothers. Providing counseling and stress management support can help mitigate sustained stress that may lead to depression, ultimately ensuring the well-being of both mother and fetus.

Further studies could explore other contributing factors influencing hypertension in pregnancy, such as genetic predisposition, physical activity levels, and socioeconomic conditions. Longitudinal research could provide deeper insights into how these factors interact over time. Additionally, examining intervention strategies aimed at reducing stress and managing obesity among pregnant women could be valuable in developing more comprehensive healthcare programs.

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