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Relationship between consumption of Sodium, calcium, and Preeclampsia during Pregnancy: a Cross-sectional

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ABSTRAK

Latar belakang: *Dunia mencatat Angka Kematian ibu sebanyak 830 perempuan meninggal yang disebabkan oleh komplikasi pada saat persalinan. Pada tahun 2015, 303.000 perempuan meninggal selama dan setelah kehamilan. Sustainable Development Goals (SDGs) memiliki taget pada tahun 2030 yang salah satunya adalah menurunkan angka kematian ibu menjadi dibawah 70/100.000 kelahiran hidup. Komplikasi dalam kehamilan dapat disebabkan karena perdarahan pada sebelum atau setelah persalinan, preeklamsia, eklamsia, infeksi dan masalah lainnya. Kasus kematian ibu di Kabupaten Bantul pada tahun 2015 adalah sebanyak 9 kasus. Kejadian komplikasi saat persalinan di RSUD Panembahan Senopati pada tahun 2017 adalah 1068 kasus. Prevalensi kejadian preeklamsia pada ibu sebanyakan 176 orang (16.47%).*

Tujuan: *Penelitian ini bertujuan untuk mengetahui hubungan dari konsumsi sodium dan kalsium dengan preeklamsia selama kehamilan pada ibu postpartum di RSUD Panembahan Senopati Bantul. Sampel pada penelitian ini adalah 54 ibu postpartum di RSUD Panembahan Senopati Bantul. Analisa data menggunakan Fisher's Exact test*

Metode: *Penelitian ini menggunakan jenis analisis observasi dengan cross-sectional design.*

Hasil: *Karakteristik dalam penelitian ini adalah sebagian besar responden berada pada kategori usia 20-35tahun sebanyak 38 orang (70.4%), mayoritas berpendidikan SMA sebanyak 28 orang (51.9%), rata-rata tidak memiliki riwayat hipertensi yaitu 51 orang (94.4%) dan responden yang tidak memiliki riwayat preeklamsia sebanyak 50 orang (92.6%). Hasil statistik dari uji Fisher's exact test dan nilai p-value 0.564 pada variabel sodium dan p-value 1.000 pada variabel kalsium (p-value >0.05).*

Kesimpulan*: Tidak ada hubungan antara konsumsi sodium dan kalsium dengan kejadian preeklamsia selama kehamilan pada ibu postpartum di RSUD Panembahan Senopati Bantul.*

KEYWORDS: *kalsium, preeklamsia*, *sodium,*

ABSTRACT

Background: *Maternal mortality as many as 830 women died due to complications in childbirth in the world. In 2015, 303.000 women died during and after pregnancy. The target of Sustainable Development Goals (SDGs) in 2030 was reduced maternal mortality rate under 70 per 100.000 live births. Pregnancy complications can be caused by bleeding before or after childbirth, preeclampsia, eclampsia, infections, and others. The maternal death case in Bantul districts in 2015 was 9 cases. The incidence of childbirth with complications in Panembahan Senopati Hospital in 2017 was 1068 people. The prevalence of preeclampsia in expectant mothers is 176 people by 16.47%.*

Objectives: *This research aims to know the relationship between sodium and calcium consumption with preeclampsia during pregnancy in the postpartum mothers at Panembahan Senopati Hospital. The number of Samples was 54 postpartum mothers in Panembahan Senopati Bantul. Processing and analysis of data using Fisher's Exact test.*

Methods: *This type of research is an analytical observational, with a cross-sectional design.*

Results: *Characteristics of most respondents in the age category of 20-35 years as many as 38 people (70.4%), education graduated of senior high school 28 people (51.9%), history of not hypertension as many as 51 people (94.4%) and has no preeclampsia history as much as 50 people (92.6%). Statistical*

test results of Fisher's Exact test and p-value of sodium were 0.564 (> 0.05) and the p-value of calcium was 1.000 (> 0.05).
***Conclusion**: There is no relationship between sodium and calcium consumption of preeclampsia problems during pregnancy in postpartum women at Panembahan Senopati Hospital.*

KEYWORDS: *calcium, preeclampsia*, *sodium*

INTRODUCTION

Pregnancy complications are the health problems that often occur during pregnancy and childbirth. Maternal health problems can occur before pregnancy which ultimately affects the complications of pregnancy (1). It is estimated in 2015, as many as 303,000 women died during pregnancy and after pregnancy (2).Based on the Sustainable Development Goals (SDGs), namely lowering the mortality rate to 70 per 100,000 live births in 2030, while the Renstra targets lowered the maternal mortality rate from 346 to 306 per 100,000 live births on In 2019 (3).

Maternal Mortality Rate in Bantul districts in 2015 as many as 11 cases, amounting to 87.5 per 100,000. According to the results of the Perinatal Maternal Audit (AMP) cause of maternal death in 2015 in Bantul districts is a heavy preeclampsia (PEB) as much as 36% (4 cases), bleeding as much as 36% (4 cases), pulmonary TB 18% (2 cases), and a 9% (1 case) of unheated water (4).

From the preliminary study results at Panembahan Senopati Hospital in January until September 2017 occurrence of childbirth with complications of 1068 cases. Bleeding before childbirth as much as 3.37% (36 cases), postoperative bleeding as much as 4.40% (47 cases), preeclampsia in pregnant women as much as 16.47% (176 cases), eclampsia in pregnant women as much as 11.42% (122 cases), infections 0% (0 cases), Others 64.32% (687 cases). According to Cunningman, preeclampsia is a hypertensive disorder in pregnancy characterized by hypertension, proteinuria, and edema after the 20th weeks. The classification of preeclampsia is mild and severe (5).

Based on the research of Nuryani (2013) on the relationship of food consumption patterns with the case of preeclampsia, statistical results showed that there is a relationship between intake of calcium and proteins with the occurrence of preeclampsia and its a risk factor. The results of fat intake, vitamin A, vitamin C, and vitamin showed that there is no relationship with preeclampsia and its not a risk factor (6).

From the description above, the author interested to do research with title is "the relationship of sodium and calcium consumption in postpartum mother with a history of preeclampsia while pregnant in Panembahan Senopati Hospital".

MATERIALS AND METHODS

The type of research used a quantitative descriptive with a cross-sectional approach. The population is the postpartum mother who has a history of preeclampsia and not during pregnancy, the sampling technique used solving with a sample number of 54 respondents. The independent variables in this study are sodium consumption and calcium consumption, the dependent variable in this study is a history of preeclampsia. Statistical tests use Fisher's Exact test.

RESULTS

The result is most respondents in the age category of 20-35 years are 38 people (70.4%) and the age under 20th years as much as 2 people (3.7%). Preeclampsia incidence is susceptible to the age of <20th years and >35th years because the pregnant in this age category are in the risk factor of pregnancy-accompanying diseases. Research from Sutrimah (2015), showed that the Chi-Square test results were 0.087 and p-value=0.768, the results of p>0.05 means that Ho was accepted and there is no significant relationship between age and risk of preeclampsia (7). The research was in accordance with the theory that indicated preeclampsia was

Table 1. Frequency Distribution Characteristic of Postpartum Women by Age, Education, and the Act of Hypertension

Characteristic	Frequency (n)	Percentage (%)
Age (years)		
<20	2	3.7
20-35	38	70.4
>35	14	25.9
Education		
Not Study	2	3.7
Primary School	6	11.1
Junior High School	14	25.9
Senior High School	28	51.9
College	4	7.4
Hypertension		
Yes	3	5.6
No	51	94.4
Preeclampsia		
Yes	4	7.4
No	50	92.6

dominant incidence occurs in pregnant women with aged <25th years incidents was 3 times the incidence and pregnant women aged >35 years can occur latent hypertension (8).

The results of classification education are most of the respondent education is graduated high school as much as 28 people (51.9%) and the respondents who didn't finish the elementary school as much as 2 people (3.7%). Research from Winda (2015), showed that education is one factor of the occurrence of preeclampsia and eclampsia (9). Because of the lowest education was a risk factor of preeclampsia (10). Another characteristic form the study showed that most of the respondents didn't have a history of hypertension as much as 51 people (94.4%) and have a history as much as 3 people (5.6%). According to the theory, hypertension is an early sign of preeclampsia with increased systolic pressure 30 mmHg or more and a diastolic increase of 15 mmHg or more or to 90 mmHg (11). This research is in line with Nuning Research (2016), stated that there was a relationship between the history of hypertension with preeclampsia in pregnancies (12). Most of the respondents didn't have a history of preeclampsia when pregnancy as much as 50 people (92.6%) and have a history of preeclampsia as much as 4 people (7.4%). Pregnant who have a history of preeclampsia on his first pregnancy will have a risk seven times after pregnancy (13). The research is in accordance with the research of Sutrimah (2015), stated that there was a significant relationship between the history preeclampsia with preeclampsia acts (7).

Table 2. Distribution Frequency of Sodium Consumption during Pregnancy in Postpartum Women at RSUD Panembahan Senopati, Bantul

Sodium	N	%
Not good (>77%)	12	22.2
Good (<77%)	42	77.8

Source: Primary Data, 2018

Table 2 showed that the participant who consume food contained sodium during pregnancy of 54 respondents, the majority of consuming sodium with good criteria is 42 respondents (77.8%) and there are 12 respondents (22.2%) is not a good category.

Table 3. Distribution Frequency of Calcium Consumption in Postpartum Women at RSUD Panembahan Senopati, Bantul

Calcium	N	%
Not good (<77%)	39	72.2
Good(>77%)	15	27.8

Source: Primary Data, 2018

Table 3 was discovered that the respondent who consumes food contained calcium during pregnancy with the majority is in not good criteria as 39 respondents (72.2%) and the smallest number of respondents (27.8%) full of feasting on offered calcium is essentially and good categories.

Based on **Table 4**. showed that respondents who consume good foods and get preeclampsia as much as 4 people (9.5%). The value of p= 0.564, means p>α = 0.05 which used Fisher's Exact test and showed there is no significant relationship between sodium consumption with preeclampsia history.

Based on **Table 5**. above respondents who consume food with no good calcium and preeclampsia as much as 3 people (7.7%). Respondents who consumed both potassium and preeclampsia as much as 1 person (6.7%). The

Table 4. The relationship between intake of Natrium with the acts of preeclampsia during Pregnancy in Postpartum Women at RSUD Panembahan Senopati, Bantul

Natrium	Preeclampsia				Total		P-Value
	Yes		No				
	N	%	n	%	n	%	
Not good (>77%)	0	0.0	12	100	12	100	0.564
Good (<77%)	4	9.5	38	90.5	42	100	

Table 5. The Relationship between Consumption of Calcium Mother Parturition with the Acts of Preeclampsia during Pregnancy in RSUD Panembahan Senopati Bantul

Calcium	Preeclampsia				Total		p-value
	Yes		No				
	N	%	n	%	N	%	
Not Good (<77%)	3	7.7	36	92.3	39	100	1.000
Good (>77%)	1	6.7	14	93.3	15	100	

value of x2 = p-value 1.000 > α = 0.05 which uses Fisher's Exact test and showed there is no significant relationship between the calcium consumption when pregnant with a preeclampsia history.

DISCUSSION

This study discusses the relationship between sodium, calcium, and preeclampsia during pregnancy. The previous study showed that the habit to consume foods containing fat and high-salt was also been one of the factors causing hypertension. The pathophysiology of hypertension was increased in blood pressure induced by sodium involves several mechanisms. In healthy conditions, sodium will be excretion through the kidneys. In cases, where the kidneys are not able to excretion of sodium as a result of damage or inability of the nephrons to be excreted sodium, sodium retention will occur. This condition means the intravascular expansion volume and increased blood pressure (14). Several factors that affect hypertension, among others: consumption of foods with high sodium and fat without offset to consume fruit and vegetables; alcohol; very-low physical activity; stress; socio-economic and genetic (15).

The type of sodium that was often consumed by pregnant in the Panembahan Senopati Hospital was fast food, biscuits, bread, chicken liver and clear vegetable (spinach). The effort of pregnant women to prevent preeclampsia is to reduce high sodium foods such as meat, excessive spinach, packaged foods and eat more fresh fruit. This is accordance with the study by Afifah in 2016, showed that there is no significant relationship between sodium intake with hypertensive incidences (p>0.05), with value OR = 1.554, 95% CI: 0,416-5,800 means the tendency to be exposed of hypertension is 1.5 times greater than a group that has a sodium intake of under 2300mg. The proportion of cases (suffering from hypertension) that have intake ≥ 2300mg almost equals much proportion of the control group (not hypertension). This is the cause of the absence of a significant relationship with the incidence of hypertension (16). The research in accordance with a research by Susmala, 2017 which states that there is no significant relationship between sodium intake with hypertensive incidence (P = 0.108) (17).

In this study, calcium intake of respondents was identified through interviews with the Semi-Quantitative Food Frequency Questionnaire (SQFFQ), which assessed the intake of the last 1 month of pregnant women who had a history of preeclampsia or not. Based on questionnaire data of calcium intake, it is known that most of the respondents of the preeclampsia or not preeclamptic groups rarely consume low calcium ingredients such as banana, *duku*, tomato, pumpkin, and coconut oil. The result is not in accordance with *Nuryani, 2012* which shows that there is a relationship between

calcium intake and preeclampsia. Results of the risk factors showed p-value = 0.0001 and OR = 18,000 with calcium intake being slightly higher in the case group compared to controls, namely 86.9% (20 people) and 13.1% (3 people) (6).

The result showed a significant relationship between substances consumed food containing calcium by pregnant with the acts of preeclampsia on the postpartum (p = 0,006) was according to *Khoerunnisa 2017*. The kinds of food calcium that often consumed patients are milk, spinach, bread and soya (14)000 live births and 101.92 / 100,000 live births in Semarang in 2010. Infant Mortality Rate (IMR. This research was in accordance with the research of Hasanah U (2017) which indicates there is no significant relationship between the intake of calcium with the incidence of hypertension (P = 0.078). Because in the hypertension group or not, the percentage of intake didn't differ considerably. The intake of calcium respondents was known through interviews using the Food Frequency Questionary (FFQ) questionnaire for a one-month intake (18).

In addition, the research is inversely proportional to the theory that low calcium intake strengthens the effect of NaCl salt intake on increasing blood pressure in pregnant at risk of hypertension. Calcium has a role in regulating blood pressure, including reducing the activity of the renin-angiotensin system, increasing the balance of sodium and potassium, and inhibiting blood vessel development. Calcium in the blood binds to free fatty acids so that the blood vessels become thickened and hardened which can reduce the elasticity of the heart which will increase blood pressure (19,20).

CONCLUSION AND SUGGESTION

The conclusion of this study is the characteristics of respondents based on the most age at the age of 20th-35th years, high school graduates, most mothers who do not have a history of hypertension or a history of preeclampsia. The exact results from Fisher's Exact test showed that there was no significant relationship between sodium and calcium consumption that consumed during pregnancy with a history of preeclampsia.

Suggestions from this study are expected to have other studies that more specifically discuss the consumption of sodium and calcium in mothers with a history of preeclampsia during pregnancy.

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