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CALCIUM INTAKE AND HYPERTENSION IN PREGNANCY

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ABSTRACT

Hypertension in pregnancy is still one of the causes of maternal death in Indonesia. In 2016, the maternal mortality rate in Special Region of Yogyakarta had increased.The most cases of maternal mortality in Bantul Regency which is caused by a complication of hypertension in pregnancy (33%). Meanwhile, the majority of pregnant women in Indonesia have an average calcium intake that is classified as less, which is 649.9 mg/day. The aim of this study was to the correlation of calcium intake with hypertension in pregnancy in Bantul Public Health Center in 2018. The type of this study was analytical survey research with the cross-sectional design. The population of this study was pregnant women in the third trimester in Bantul Regency Public Health Center in 2018 with a sample size of 95. The sampling technique used consecutive sampling. The data analysis used the chi-square test. Calcium intake in pregnant women in Bantul Regency Public Health Center in 2018 was classified as inadequate at 90.5%. Pregnant women with less calcium intake who experienced hypertension in pregnancy were as much as 5.8%, while pregnant women with adequate calcium intake who experienced hypertension in pregnancy were as much as 11.1%. Based on the chi-square test known p-value = 0.639. There was no significant correlation between calcium intake with hypertension in pregnancy at Bantul Regency Public Health Center in 2018.

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INTRODUCTION

Maternal Mortality Rate (MMR) is the number of maternal deaths during pregnancy, childbirth and post-partum caused by pregnancy, childbirth, and postpartum or its management, but not for other reasons such as accident or fall in every 100.000 live births.[1] Data showed that MMR in Indonesia based on Indonesian Demographic and Health Survey (IDHS) in 2012 (359 per 100.000 live births) had increased compared to the data of IDHS in 2007 (228 per 100.000 live births).[2] Hypertension in pregnancy is unlike hypertension that occurs in general, but it has a close connection with high pain and mortality both in the fetus and in the mother.[3] In 2016, the number of maternal deaths in Special Region of Yogyakarta had increased up to 39 cases from 29 cases. The most

cases occurred in Bantul Regency were as many as 12 cases and the lowest cases were in Gunungkidul Regency, which was 5 cases.[2] The result of Maternal Perinatal Audit (MPA) concluded that the cause of maternal death in Bantul Regency in 2016 was Preeclampsia of 33%, bleeding by 17%, heart failure 17%, sepsis 17%, and others 16%. The most cases of maternal death in Bantul Regency are due to a complication that occurs from hypertension in pregnancy, namely preeclampsia/eclampsia. The spread of maternal deaths in 2016 in Bantul Regency occurred in several sub-districts.[4] According to a study conducted by Katski, hypertension in pregnancy was a multifactorial disorder.[5] According to a study conducted by Lutfiatunnisa (2016), factors that were proven to be associated with the incidence of hypertension in pregnancy were the level of knowledge, history of hypertension, nutritional status before pregnancy, weight gain during pregnancy, fat consumption and calcium consumption.[6] Many theories have been put forward regarding the occurrence of hypertension in pregnancy, but none of these theories are considered to be absolutely true. Some study results show that deficiencies in nutritional deficiency play a role in the occurrence of hypertension in pregnancy. Calcium deficiency in the diet of pregnant women carries the risk of developing hypertension in pregnancy.[7] Calcium requirement increases during pregnancy because it is used to replace maternal calcium reserves for new tissue formation in the fetus.[8] Besides being important for maternal and fetal bone health, enough calcium intakes can reduce the incidence of hypertension during pregnancy.[9] Pregnant women in developing countries generally have low calcium intake and are at risk of developing hypertension in pregnancy. A study conducted by Purnasari in Jember District showed that food calcium intake met 67.7% Estimated Average Requirement (EAR) of calcium and the level of calcium adequacy of most pregnant women (81.2%) was classified as a deficit. A study conducted by Belizan and Villar showed that the average calcium intake of pregnant women in Colombia was low, which was at 240 mg/day and the incidence of preeclampsia was high, with 1.59 out of 1000 births.[10] Indonesia is a developing country with abundant natural wealth, but various nutritional problems often occur especially in pregnant women. Calcium needs in pregnant women in developing countries have not been a concern, even though calcium deficiency will endanger the health of the mother and fetus.[11, 12, 13] During this time, information on calcium intake and its effects on hypertension in pregnancy are still limited. The existence of this information is important as input for planning policies related to the prevention of hypertension in pregnancy and improving the nutrition of pregnant women, especially in the Bantul Regency. The aim of this study was to the correlation of calcium intake with hypertension in pregnancy at Public Health Center that located in Bantul Regency. Researchers selected several Public Health Center or *Puskesmas* in Bantul

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Regency as a place to conduct the study because the maternal mortality cases in Bantul Regency were mainly caused by hypertension in pregnancy that occurred in several sub-districts. The result of this study was expected to enrich empirical evidence to find out other factors that could cause hypertension in pregnancy.

METHOD

This research was analytical survey research with the cross-sectional design. The population in this study was third-trimester pregnant women at Bambanglipuro Public Health Center and Pleret Public Health Center. The sampling technique used consecutive sampling, there were 95 pregnant women who met the inclusion and exclusion criteria. The inclusion criteria in this study were the third-trimester pregnant women residing in Bambanglipuro Public Health Center and Pleret Public Health Center, having conducted Antenatal Care at Bambanglipuro Public Health Center and Pleret Public Health Center and were willing to participate in the study and signed the informed consent. Exclusion criteria in this study were pregnant women with multiple pregnancies, primigravida, under 20 years old or 35 years old, obese (having a BMI >30), history of hypertension before pregnancy, and history of hypertension from the family. This study was held on June 6-23, 2018, which previously had received permission from the ethics commission of Health Polytechnic Ministry of Health Yogyakarta with letter number No. LB.01.01/KE-01/XXII/530/2018.

The instrument of data collection in this study used was food recall 24 hours to measure calcium intake, mercury sphygmomanometer and stethoscope to measure respondent's blood pressure. Data collection was done twice, on the first day with direct interviews and on the third day using phone cell. Researchers calculated the amount of calcium obtained from food consumed by respondents using the NutriSurvey program to determine the nutritional value of calcium by entering the type of food and household size to a computer program. The results of the calculation were compared with the Nutrition Adequacy Rate recommended for the Indonesian Ministry of Health Republic of Indonesia in 2013 to determine calcium intake. The data analysis used the Chi-square statistical test. The analysis was carried out with the help of the SPSS version 16 computer software application.

RESULT

Table 1. Frequency Distribution of Subject Based on Adequacy of Calcium Intake at Bantul Regency Public Health Center in 2018

Calcium Intake	f	%
Inadequate	86	90.5
Adequate	9	9.5
Total	95	100

Based on table 1, it could be concluded that out of the 95 study subjects, most of them had inadequate calcium intake as much as 86 samples (90.5%). On the other way, pregnant women who had enough calcium intakes were 9 samples (9.5%). Therefore, according to the table, it could be concluded that there were still many pregnant women in Bantul Regency Public Health Center in 2018 who were having a calcium intake less than the recommended calcium adequacy of 1200 mg for pregnant women between the age 30-35 years old; 1300 mg for pregnant women between the age 20-29 years old.

Table 2. Frequency Distribution of Subjects Based on Hypertension in Pregnancy at Bantul Regency Public Health Center in 2018

Hypertension in Pregnancy	f	%
Hypertension in Pregnancy	6	6.3
No Hypertension in Pregnancy	89	93.7
Total	95	100

The data on table 2 indicated that out of 95 study subjects, those who experienced hypertension in pregnancy were 6 (6.3%). Pregnant women who did not experience hypertension in pregnancy were 89 (93.7%). According to the table, it could be concluded that the prevalence of hypertension in pregnancy in the Bantul Regency Public Health Center in 2018 was quite a lot.

Table 3. Correlation between Calcium Intake and Hypertension in Pregnancy at Bantul Regency Public Health Center in 2018

Calcium Intake	Hypertension in Pregnancy				Total		p-value
	Hypertension in Pregnancy		No Hypertension in Pregnancy				
	N	%	n	%	n	%	
Inadequate	5	5.8	81	94.2	86	100	0.639

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Adequate	1	11.1	8	88.9	9	100
Total	6	6.3	89	93.7	95	100

Based on Table 3, it could be concluded that out of 86 pregnant women who had less calcium intake, the majority did not experience hypertension in pregnancy were as much as 81 (94.2%). Whereas, pregnant women who had hypertension in pregnancy were 5 (5.8%).Out of the 9 pregnant women who had sufficient calcium intake, most did not experience hypertension in pregnancy were as many as 8 (88.9%), while pregnant women who had hypertension in pregnancy were 1 (11.1%). Therefore, according to these results, it could be concluded that there were differences between pregnant women who had inadequate calcium intake and pregnant women who have sufficient calcium intake with the incidence of hypertension in pregnancy at Bantul Regency Public Health Center in 2018. Based on these data, the obtained p-value = 0.639 so that the p-value> 0.05. This meant that statistically, calcium intake did not have a significant correlation with the prevalence of hypertension in pregnancy at the Bantul Regency Public Health Center in 2018.

DISCUSSION

The result of the study suggested that there were differences between pregnant women who had inadequate calcium intake and pregnant women who had sufficient calcium intake with the prevalence of hypertension in pregnancy at the Bantul Regency Public Health Center in 2018. The result of the analysis in this study calcium intake did not have a significant correlation with hypertension in pregnancy at Bantul Regency Public Health Center in 2018. Therefore, the result of this study was not in line with the theory of nutritional deficiency/diet theory proposed by Prawiroharjo in which the theory of nutritional deficiency/diet theory was one of the theories about the occurrence of hypertension in pregnancy.[7] The low calcium intake in pregnant women resulted in an increase in parathyroid hormone (PTH), which would cause intracellular calcium to increase through the permeability of the cell membrane to calcium. This resulted in calcium from the mitochondria being released into the cytosol. Increased level of intracellular calcium caused smooth muscle vessels to be easily stimulated for vasoconstriction which resulted in increased blood pressure.[6]

The result of this study was not in line with the study conducted by Lutfiatunnisa in the work area of Gatak Public Health Center. The result showed that there was a

significant correlation between calcium consumption and hypertension in pregnancy and consumption of calcium was a risk factor for hypertension in pregnancy. In addition, other factors that had been proven to be associated with hypertension on pregnancy were the level of knowledge, history of hypertension, nutritional status before pregnancy, weight gain during pregnancy, fat consumption and calcium consumption ($p < 0.05$).[6]

The result of this study was in line with the study conducted by Febriana at the Bulu District of Temanggung Regency Public Health Center. The result showed that there was no significant correlation between systolic and diastolic blood pressure with calcium in pregnant women in the second and third trimester because of the p-value> 0.05. The absence of a correlation of calcium intake with blood pressure could be caused by several other intake factors consumed by pregnant women.[14] This study was in line with a study conducted by Dian which showed that there was no correlation between calcium intake and blood pressure (p-value = 0.098).[15]

According to the result of this study, the absence of a correlation of calcium intake with hypertension in pregnancy could be caused by several things, one of which was a minimal sample calculation. The number of samples used in this study was still lacking so that in this study the prevalence of sufficient calcium intake was obtained a little.

CONCLUSION

There was no significant correlation between calcium intake and hypertension in pregnancy so that pregnant women who had adequate intake and those with inadequate intake had nothing to do with the prevalence of hypertension in pregnancy.

SUGGESTIONS

Suggestions that could be expressed based on the findings in this study, among others, for pregnant women were expected to maintain nutritional intake during pregnancy from food or supplements so that the nutritional needs for the mother and fetus were fulfilled. The midwife was expected to improve midwifery services with counseling, information, and education about adequate intake calcium for pregnant women.

REFERENCES

1. Kementerian Kesehatan RI. Profil Kesehatan Indonesia Tahun 2016. Jakarta: Kementerian Kesehatan RI. [Internet]. 2017. Available from: http://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Profil-Kesehatan-Indonesia-2016.pdf

ISSN: 2599-3224 (Online)
ISSN: 2302-6014 (Print)

2. Dinas Kesehatan Provinsi DIY. Profil Kesehatan Provinsi DIY Tahun 2016. DIY: Dinas Kesehatan DIY. 2017.
3. Varney, Helen, Jan M. Kriebs, Carolyn L.Gegor. BukuAjarAsuhanKebidanan Ed. 4 Vol. 1 .Jakarta: EGC. 2008.
4. Dinas Kesehatan Kabupaten Bantul. Profil Kesehatan Kabupaten Bantul Tahun 2017.Bantul: Dinas Kesehatan Bantul. 2018.
5. Katsiki, Niki, Dimitrios G, Spyridon K, Apostolos H. Hypertension in Pregnancy: Classificatiom, Diagnosis, and Treatment.Aristotle University Medical. 2010 Juni Vol.37 No.2: 9-18. [Internet]. 2010. Available from: https://ejournals.lib.auth.gr/aumj/article/view/4709/4810
6. Lutfiatunnisa, A.A.A, Anita Nugrahaeni, Sri Yuliawati, dan Dwi Sutiningsih. Faktor Host, Konsumsi Lemak, Konsumsi Kalsium, dan Kejadian Hipertensi pada Kehamilan. VisiKes Jurnal Kesehatan Masyarakat. 2016 September Vol.15 No.2: 69-78. [Internet]. 2016. Available from: https://publikasi.dinus.ac.id/index.php/visikes/article/view/1436/1069
7. Prawiroharjo, Sarwono. Ilmu Kebidanan. Jakarta: Bina Pustaka. 2010.
8. Kementerian Kesehatan RI. Pedoman Gizi Seimbang. Jakarta: Kementerian Kesehatan RI. [Internet]. 2014. Available from: http://gizi.depkes.go.id/download/Pedoman%20Gizi/PGS%20Ok.pdf
9. Say L, Chou D, et al. Global Causes of Maternal Death: AWHO Systematic Analysis. Lancet Glob Health. 2014 June Vol.2 No.6:e323-e333. [Internet]. 2014. Available from: http://www.thelancet.com/pdfs/journals/langlo/PIIS2214-109X(14)70227-X.pdf
10. Purnasari, Galih. Faktor-Faktor yang Berhubungan dengan Kecukupan Kalsium pada Ibu Hamil di Kabupaten Jember. Thesis. Bogor: Institut Pertanian Bogor. [Internet]. 2016. Available from: http://repository.ipb.ac.id/jspui/bitstream/123456789/82577/1/2016gpu.pdf
11. Purnasari, Galih, Dosik B, Cesilia M.D. Kepatuhan Konsumsi Suplemen Kalsium serta Hubungannya dengan Tingkat Kecukupan Kalsium pada Ibu Hamil di KabupatenJember. Jurnal Kesehatan Reproduksi. 2016 Agustus Vol.7 No.2: 83-93. [Internet]. 2016. Available from: http://ejournal.litbang.depkes.go.id/index.php/kespro/article/view/4968/4470
12. Bhutta, Z.A, Jai K. Das, Arjumand R, Michelle F.G, et al. Evidence-Based Interventions for Improvement of Maternal and Child Nutrition: What Can Be Done and at What Cost. The Lancet. 2013 June. [Internet]. 2013. Available from:

https://www.unicef.org/ethiopia/2_Evidencebased_interventions_for_improvement_of_maternal.pdf

13. Palacios, C, and Pena-Rosas. Calcium Supplementation during Pregnancy for Preventing Hypertensive Disorders and Related Problems: Reproductive Health Library. Geneva: World Health Organization. [Internet]. 2010. Available from: https://www.slan.org.ve/publicaciones/completas/pdf/Palacios.%20Calcium%20supplementation%20during%20pregnancy%20for%20preventing%20hypertensive%20disorders%20and%20related%20problems.pdf
14. Febriana, Ella, M.Zen Rahfiludin, Dina Rahayuning P. HubunganAsupan Natrium, Kalsium, dan Magnesium dengan Tekanan Darah pada Ibu Hamil Trimester II dan III.Jurnal Kesehatan Masyarakat. 2017 Oktober Vol.5 No.4 ISSN: 2356-3346. [Internet]. 2017. Available from: https://ejournal3.undip.ac.id/index.php/jkm/article/viewFile/18733/17811
15. Lestari, Dian. Hubungan Asupan Kalium, Kalsium, Magnesium, dan Natrium, Indeks Massa Tubuh, serta Aktifitas Fisik dengan Kejadian Hipertensi pada Wanita Usia 30-40 Tahun. Semarang: FK UNDIP. [Internet]. 2010. Available from: http://eprints.undip.ac.id/24915/2/313_Dian_Lestari_G2C006017.pdf