ISSN 1978-6743
E-ISSN 2477-3948
Jurnal Ilmiah Kesehatan
(Journal of Health Science)
Fakultas Keperawatan dan Kebidanan | Universitas Nahdlatul Ulama Surabaya

The Correlation Between Total Cholesterol Levels In Pregnancy Women And Baby Birth Weight

Uliyatul Laili [1], *Rizki Amalia* [2]

[1,2] *Universitas Nahdlatul Ulama Surabaya, Surabaya, Indonesia*

ARTICLE INFORMATION

Received: December, 5, 2020
Revised: April, 14, 2021
Available online: May 2021

KEYWORDS

Total Cholesterol levels, Birth Weight, Pregnant Woman, Baby

CORRESPONDENCE

E-mail: uliyatul.laili@unusa.ac.id
amalia24@unusa.ac.id
No. Tlp : +6285694374759

A B S T R A C T

Maternal nutritional intake during pregnancy will affect fetal growth and development, including cholesterol intake. The fetus obtains amino acids and fatty acids through the placental absorption mechanism. The fetus needs cholesterol levels in pregnant women to meet fetal cholesterol during organogenesis. This study aims to determine the correlation between total cholesterol levels in pregnant women and baby birth weight. The research method was a prospective cohort. It took place at the Endang Maternity Clinic, Sidoarjo, from June to August 2020. The sample in this study was 33 respondents in the third trimester of pregnancy. This paper used purposive sampling. The independent variable was total cholesterol levels, while the dependent variable was baby birth weight. Cholesterol levels were evaluated by digital measurements using easy touch GCU (Glucose, Cholesterol, Uric acid) meter device, while birth weight was measured using baby scales. The data analysis utilized fisher's exact test. The results showed that most respondents had normal cholesterol levels (75.8%) and a baby birth weight between 2500 - 4000 grams (81.8%). Based on the data analysis p-value was 0.137($p > 0.05$). This study concludes that there is no correlation between total cholesterol levels in pregnant women and baby birth weight. Health workers should conduct cholesterol counseling and monitoring in pregnant women.

INTRODUCTION

Infant Mortality Rate (IMR) is the number of infant deaths in the first 28 days of life per 1000 live births. In Indonesia, 45% of child mortality occurs during the neonatal period or the first month of life (Kementerian Kesehatan Republik Indonesia, 2016; UNICEF Indonesia, 2012). Low birth weight (LBW) caused most infant deaths in East Java in 2019 (Dinkes Jawa Timur, 2019). It happens because of preterm delivery (<37 weeks), small babies during pregnancy, or both. Infants with LBW had 20 times the risk of mortality in the neonatal period than babies born with normal weight (≥ 2500 grams) (Kramer, 1987). Also, babies with small gestational age (SGA) have a 5-fold risk of neonatal death compared to babies born normally (García-Basteiro et al., 2017).

A study showed that the unbalanced lipid content during pregnancy could change fetal lipid metabolism to impact fetal growth and development and maternal metabolism (Wild, 2015; Jin *et al.*, 2016). Maternal malnutrition, inflammation, and infection during pregnancy can impact lipid changes during pregnancy and fetal outcomes.

Cholesterol levels are a form of free fatty acids. Cholesterol levels in pregnant women increase compared to the conditions before pregnancy, impacting fetal growth and development. The nutritional intake of pregnant women dramatically influences the growth and development of the fetus. Cholesterol levels in

https://doi.org/10.33086/jhs.v14i2.1845

the mother obtained by uptaking and using low-density lipoproteins (LDL) by the placenta to get essential fatty acids and amino acids needed by the fetus. The process of endocytosis by the placenta on LDL particles plays an important role. LDL is the primary precursor for progesterone synthesis by the corpus luteum. HDL particles deliver cholesterol for progesterone synthesis (Baardman et al., 2013).

Hypercholesterolemia causes changes in vascular reactivity that can affect the supply of oxygen and nutrients to the fetus via the placenta. Cholesterol is an indispensable source for fetal hormone synthesis. Although cholesterol is necessary for fetal growth, excess cholesterol in pregnant women should be evaluated as a risk factor during pregnancy and fetal development (Zeljkovic *et al.*, 2013). A study in the Gambia showed that lipid levels during pregnancy are associated with the baby's birth weight and the risk of low birth weight (BLR) and small gestational age (SGA). This association varies according to lipid levels in each of the changes during pregnancy because maternal lipid levels affect fetal growth and birth outcomes (Sandra *et al.*, 2020). A previous study reported that the LBW incidence was still high and required proper management (Nadhifah *et al.*, 2012).

METHOD

The research method was a prospective cohort. It took place at the Endang Maternity Clinic, Sidoarjo, from June to August 2020. The population in this study were trimester III pregnant women at Endang Maternity Clinic. The samples were trimester III pregnant women with the inclusion criteria of mothers who had no history of disease and comorbidities during pregnancy. Sampling used purposive sampling as many as 33 respondents. The independent variable in this study was total cholesterol levels, while the dependent variable was baby birth weight. Cholesterol levels were evaluated by digital measurements using easy touch GCU (Glucose, Cholesterol, Uric acid) meter device, while birth weight was measured using baby scales. The data analysis utilized fisher's exact test.

RESULT

Table 1 Cholesterol Levels in Pregnant Women and Baby Birth Weight

Variable		Frequency	Percentage (%)
Cholesterol Levels	Normal	25	75.8
	Abnormal	8	24.2
Birth Weight	< 2500 grams	6	18.2
	2500 – 4000 grams	27	81.8

Table 1 shows that most respondents have normal cholesterol levels (75.8%) and a baby birth weight between 2500 - 4000 grams (81.8%).

https://doi.org/10.33086/jhs.v14i2.1845

Table 2. Cross Table Between Cholesterol Levels in Pregnant Women and Baby Birth Weight

		Birth Weight				p-value
		< 2500 gr		2500 – 4000 gr		
		n	%	n	%	
Cholesterol Levels	Normal	3	9,1	22	66.6	0.137
	Abnormal	3	9,1	5	15.2	
Total		6	18,2	27	81.8	

Table 2 describes that most respondents (66%) with normal cholesterol levels give birth to babies with normal birth weight (2500-4000 grams). Based on the results of statistical test analysis, the P-value of fisher's exact test was 0.137 ($p>0.05$), so there was no correlation between cholesterol levels and baby birth weight.

DISCUSSION

The results showed no correlation between cholesterol levels in pregnant women and baby birth weight, with $p = 0.137$. Based on the research results, many factors can affect the fetal outcome/birth weight. Baby birth weight is influenced by several factors, namely internal factors, and external factors. Internal factors that affect the baby's birth weight are pregnancy spacing, parity, hemoglobin levels, nutritional status, and disease during pregnancy (Maryunani, 2013). During pregnancy, these factors affect baby growth and development. Most of the fetuses born to mothers with these factors will be delivered with low birth weight.

Another problem that can affect the growth process of the fetus in the uterus is cholesterol levels in pregnant women. The fetus needs cholesterol in the right amount, and when it is excessive, it can cause problems. The increased LDL influences the increased cholesterol levels in the blood—secondary LDL due to a significant buildup in triglycerides in the circulation (Thais et al., 2011). Cholesterol disorders in pregnant women are associated with abnormal pregnancy outcomes. A study found an association between low serum cholesterol in pregnant women and pregnancy outcomes, including microcephaly and growth retardation. Previous research reported the same finding that low concentrations of LDL-cholesterol and serum total cholesterol levels of pregnant women cause intrauterine growth restriction (IUGR) (Vrijkotte et al., 2012). Cholesterol levels need to get attention to pregnant women with a pregnancy age more than 35 years. Though it is not directly related to pregnancy, it can affect the mother's health.

CONCLUSION

In conclusion, there is no significant correlation between total cholesterol levels in pregnant women and baby birth weight. Health workers should conduct cholesterol counseling and monitoring in pregnant women.

https://doi.org/10.33086/jhs.v14i2.1845

REFERENCE

Baardman, M. E., Kerstjens-Frederikse, W. S., Berger, R. M. F., Bakker, M. K., Hofstra, R. M. W., & Plösch, T. (2013). The role of maternal-fetal cholesterol transport in early fetal life: Current insights. *Biology of Reproduction*, *88*(1), 1–9. https://doi.org/10.1095/biolreprod.112.102442

Dinkes Jawa Timur. (2019). *Profil Kesehatan Provinsi Jawa Timur 2019*. Surabaya: Dinas Kesehatan Provinsi Jawa Timur.

García-Basteiro, A. L., Quintó, L., Macete, E., Bardají, A., González, R., Nhacolo, A., Sigauque, B., Sacoor, C., Rupérez, M., Sicuri, E., Bassat, Q., Sevene, E., & Menéndez, C. (2017). Infant mortality and morbidity associated with preterm and small-for-gestational-age births in Southern Mozambique: A retrospective cohort study. *PLoS ONE*, *12*(2), 1–14. https://doi.org/10.1371/journal.pone.0172533

Jin, W. Y., Lin, S. L., Hou, R. L., Chen, X. Y., Han, T., Jin, Y., Tang, L., Zhu, Z. W., & Zhao, Z. Y. (2016). Associations between maternal lipid profile and pregnancy complications and perinatal outcomes: A population-based study from China. *BMC Pregnancy and Childbirth*, *16*(1), 1–9. https://doi.org/10.1186/s12884-016-0852-9

Kementerian Kesehatan Republik Indonesia. (2016). Profil Kesehatan Indonesia 2016. In *Profil Kesehatan Provinsi Bali*. http://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Profil-Kesehatan-Indonesia-2016.pdf

Kramer, M. S. (1987). Determinants of low birth weight: Methodological assessment and meta-analysis. *Bulletin of the World Health Organization*, *65*(5), 663–737.

Maryunani, A. (2013). *Buku Saku Asuhan Bayi Dengan Berat Badan Lahir Rendah*. Trans Info Media.

Nadhifah, L., Yasin, H., & Sugito. (2012). Analisis Faktor-faktor yang Mempengaruhi Bayi Berat menggunakan Metode Bayes. *Gaussian*, *1*(1), 125–134.

Okala, S. G., Sise, E. A., Sosseh, F., Prentice, A. M., Woollett, L. A., & Moore, S. E. (2020). Maternal plasma lipid levels across pregnancy and the risks of small-for-gestational age and low birth weight: A cohort study from rural Gambia. *BMC Pregnancy and Childbirth*, *20*(1), 1–16. https://doi.org/10.1186/s12884-020-2834-1

Thais, C., Kashish, G., Daniel Corrêa de Sa´, Charlotte, K., & et al. (2011). Central Obesity and Survival in Subjects With Coronary Artery Disease. *Journal of the American College of Cardiology*, *57*(19), 1877–1886. https://doi.org/10.1016/j.jacc.2010.11.058

UNICEF Indonesia. (2012). *Ringkasan kajian kesehatan ibu dan anak*. https://www.unicef.org/indonesia/id/A5

Vrijkotte, T. G. M., Krukziener, N., Hutten, B. A., Vollebregt, K. C., Van Eijsden, M., & Twickler, M. B. (2012). Maternal lipid profile during early pregnancy and pregnancy complications and outcomes: The ABCD study. *Journal of Clinical Endocrinology and Metabolism*, *97*(11), 3917–3925. https://doi.org/10.1210/jc.2012-1295

Wild, R., Weedin, E. A., & Wilson, D. (2015). Dyslipidemia in Pregnancy Dyslipidemia Hyperlipidemia Pregnancy Fetal metabolism Metabolic syndrome. *Cardiology Clinics*, *33*(2), 209–215. http://dx.doi.org/10.1016/j.ccl.2015.01.002

Zeljkovic, A., Vekic, J., & Spasic, S. (2013). *Changes in LDL and HDL Subclasses in Normal Pregnancy and Associations with Birth Weight , Birth Length and Head Circumference*. 556–565. https://doi.org/10.1007/s10995-012-1031-x