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Level of serum protein in mothers as a long risk factor of short birth baby lenght

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ABSTRACT

Backgrounds

Pregnant women are one of the groups that experience malnutrition easily, so that can cause baby born short. The percentage of pregnant women in Indonesia with protein intake is still very low. The length of a short-born baby is a risk factor for stunting. One way to reduce stunting is to improve maternal nutritional status during pregnancy.

Objective

To prove that serum protein levels in the mother that affect the length of a short-born baby is low.

Methods

The type of this research is observational analytic research by using a case control design. This research used 48 respondents as research subjects divided into 24 people of case groups and 24 people of control groups. Mothers who had given birth in the case group and the control group were taken for blood to measure serum protein levels. Bivariate analysis using chi square.

Results

There was no significant relationship between serum protein levels in mothers with length of a short-born baby events with $p = 0.380$ and $OR = 2,000$ (95% CI = 0.623-6.421). Mothers with less serum protein levels have risk 2,000 times to give birth to babies with short birth lengths compared to mothers with normal serum protein levels.

Conclusion

Serum protein levels in the mother were not proven to be factors that influence the birth length of short babies.

Keywords: Serum Protein Levels, Short Birth Length, Stunting

INTRODUCTION

The length of birth of a baby can describe linear growth during the womb. If the baby is born with a short body length, it shows a disturbance during the womb which usually shows the condition of malnutrition (chronic nutrition) suffered by the mother (Par'i, 2017). Babies to have a short birth length if the birth length is <48 cm. (Ministry of Health, 2013). Maternal nutritional status factors that affect

baby's birth length are <150 cm maternal height, body mass index before pregnancy <18.5, protein consumption <100 AKG, and maternal weight gain during pregnancy <9.1 kg (Irawati & Salimar, 2014).

The length of the short-term baby is a risk factor for stunting. (Trihono, Tjandrarini, Irawati, Utami, & Nurlinawati, 2015). Short-term birth length results are 1.56 times stunting, so if not handled properly, babies with short birth lengths this will stunting and impact stunting across generations. (Rahmadi, 2017; Trihono et al., 2015). Stunting is a condition of a person's height that is shorter than the 2005 standard WHO-MGRS (Multicentre Growth Reference Study)

According to the WHO (World Health Organization) in 2016, in the world there are around 155 million children under 5 years of age who are stunted (Organization, 2016) Stunting is said to be a health problem in the community if the prevalence of under-five children is above 20%. In 2013 compared to several other Southeast Asian countries, the prevalence of stunting children in Indonesia (37.2%) was highest when compared to Myanmar (35%), Vietnam (23%), Malaysia (17%), Thailand (16%) and Singapore (4%) (RI, 2016).

The prevalence of stunting children in Indonesia is 30.8%, compared to 2013 (37.2%) and in 2010 (35.6%), there has been a decrease in the prevalence of stunting. In Central Java Province the prevalence of stunting was 31.2% (Indonesia, 2018). One of the districts with the highest number of stunting toddlers in Central Java is a priority for the intervention of stunting children, namely Brebes Regency with a number of stunting children, around 69,201 children under five (Poverty, 2017).

Mothers during pregnancy need additional complete protein as the main ingredient for the formation of body cells for the fetus. The quality and quantity of good protein intake can function as Insulin Growth Factor 1 (IGF-1) which is a mediator of growth hormone and bone matrix formation. Mothers consuming <100% AKG protein will affect 1.1-2.7 birth lengths (Trihono et al, 2015).

The right solution is needed to prevent the occurrence of a short baby birth length, which starts from the time of pregnancy so as not to give birth to a short baby. Based on the description above, the purpose of this study is "Proving serum protein levels in the mother that affect the short birth length of the baby".

METHOD

Study design

This type of research is observational analytic research, using case control design. The case control study began by identifying case-affected patients (infants with short birth lengths) and the control group without being affected (infants with normal birth lengths); then retrospectively traced risk factors that could explain why cases were affected, while controls did not (Sastroasmoro & Ismael, 2011).

Sample

In this study the population was all newborns and mothers of infants in the Brebes District Hospital in 2019. The sampling technique in this study was purposive sampling. The sample in this study consisted of 48 people divided into 24 intervention groups and 24 control groups.

Ethical considerations

Ethical approval was obtained from the ethics commission of the Health Faculty of Dentistry Sultan Agung Islamic University, Semarang with an ethical approval number is 075/B.1-KEPK/SA-FKG/V/2019.

RESULT

Respondent characteristics

Tabel 1 Frequency distribution of respondent characteristics based on mother's height, weight gain during pregnancy, arm circumference size, hemoglobin level, and history of maternal infectious diseases during pregnancy

Variabel	Category	Case N	Case %	Control N	Control %
Mother's height	Normal	20	83,3	20	83,3
	Less	4	16,7	4	16,7
Weight gain during pregnancy	Normal	15	62,5	19	79,2
	Less	9	37,5	5	20,8
Mother's Arm circumference size	Normal	18	75,0	21	87,5
	Less	6	25,0	3	12,5
Hemoglobin level	Normal	13	54,2	18	75,0
	Less	11	45,8	6	25,0
Maternal infctious diseases during pregnancy	Yes	5	20,8	4	16,7
	No	19	79,2	20	83,3

Bivariate analysis

Tabel 2 Serum protein levels in mothers as a risk factor for short birth length

Serum protein level	Short infant birth events Short N	Short %	Normal N	Normal %	P value	OR	95%CI
Normal	8	33,3	12	50	0,380[a]	2,000	0,623-6,421
Less	16	66,7	12	50			
Total	24	100	24	100			

[a] chi square

Based on table 2 above shows that the proportion of mothers with serum protein levels is greater in the short infant group (66.7%) than in the normal infant group (50%). The results of statistical tests showed that there was no significant relationship between serum protein levels in mothers with a short birth length event with a value of p = 0.380 and not a risk factor for short birth length events with OR = 2.0 (95% CI = 0.623- 6.421). Mothers with serum protein levels have a 2.000 times greater risk of giving birth to babies with short birth lengths compared to mothers with normal serum protein levels.

Tabel 3 The relationship between confounding variables and the incidence of short birth lengths

Variabel	Category	Case N	Case %	Control N	Control %	P value
Mother's height	Normal	20	83,3	20	83,3	
	Less	4	16,7	4	16,7	0,650[b]
Weight gain during pregnancy	Normal	15	62,5	19	79,2	
	Less	9	37,5	5	20,8	0,341[a]
Mother's Arm circumference size	Normal	18	75,0	21	87,5	
	Less	6	25,0	3	12,5	0,231[b]
Hemoglobin level	Normal	13	54,2	18	75,0	
	Less	11	45,8	6	25,0	0,227[a]
Maternal infctious diseases during pregnancy	Yes	5	20,8	4	16,7	
	No		7		8	0,500[b]
		9	9,2	0	3,3	

[a] chi square
[b] Fisher

Based on table 3 above shows that statistically all confounding variables are not proven to be risk factors for short birth length. This shows that maternal height, weight gain during pregnancy, arm circumference, hemoglobin level and history of infectious diseases in this study can be controlled.

DISCUSSION

In this study, short babies were born to most mothers with normal height. There is no difference in birth length between mothers with normal and abnormal height (Yustiana & Nuryanto, 2014). Most of the mothers in this study experienced normal body weight gain of 34 respondents (70.8%). When pregnant all nutrients are needed more, but protein and mineral intake such as iron and calcium are often less consumed which also play a role in fetal bone formation while in the womb (Arisman, 2010; Trihono et al., 2015).

The average arm circumference of respondents in the case group and the control group was included in the normal category (≥23.5 cm), which was 81.23% of respondents. When the size of the arm circumference for pregnant women is used as chronic energy deficiency screening to detect the risk of mothers giving birth to short babies and low birth weight (LBW) (Par'i, 2017).

The hemoglobin levels of the respondents in this study were mostly in the normal category (≥11 g / dl) which was 64.58%. But in the case group more mothers with hemoglobin were less than normal than the control group, which was 45.8%. So short babies born to most mothers with hemoglobin are less normal or anemia. Anemia is a condition where the hemoglobin level in the blood is below normal. Hemoglobin plays a role in transporting oxygen throughout the body (Destarina, 2018). Anemia can cause stunted growth and development of the fetus through impaired nutrient supply and utero placenta oxygenation. This can increase maternal delivery of IUGR (intra-uterine growth retardation), infants born with anemia, and preterm labor (Yustiana & Nuryanto, 2014).

In this study most of the respondents did not have a history of infectious diseases during pregnancy which was 81.25%. Only about 18.75% of respondents have a history of infectious diseases during pregnancy. If during pregnancy the mother does not suffer from an infectious disease, nutritional status can be better

and the adequacy of maternal nutrition during pregnancy can be monitored through weight gain during pregnancy, an assessment that can be done to estimate the rate of fetal growth (Arisman, 2010).

Based on the results of the chi square test in this study, there was no significant relationship between serum protein levels in mothers with a short birth length event with a value of $p = 0.380$ and not a risk factor for short birth length infants with OR = 2.000 (95% CI = 0.623-6,421). Odd ratio of maternal serum protein level was 2.000, which means that mothers with low serum protein levels had a 2.000 times greater risk of giving birth to babies with short birth lengths compared to mothers with normal serum protein levels. There is no correlation between maternal protein consumption during pregnancy and the length of birth of the baby (Setyawati, Barida, & Irawati, 2016).

The results that are not statistically significant in this study can be attributed to different sources of protein intake between each mother and thus have different effects on fetal linear growth. In general, the quality of animal protein intake is better than vegetable protein. Intake of animal protein has advantages such as a more complete amino acid composition, containing iron that is easily absorbed and digestibility of animal protein intake better than vegetable protein intake (Oktaviani, Pratiwi, & Rahmadi, 2018; Setyawati et al., 2016). But the type of animal protein intake is a food that is difficult to reach for some people who have low income because of the high price (Ernawati, Rosamalina, & Permanasari, 2013).

CONCLUSION

Low serum protein levels in the mother were not proven to be the effect of the birth length of the short baby and were not statistically significant ($p = 0.380$). Odd ratio of maternal serum protein level was 2,000 (95% CI = 0.623-6,421) which means that mothers with low serum protein levels had a 2,000 times greater risk of giving birth to babies with short birth lengths compared to mothers with normal serum protein levels.

REFERENCES

[1]. Arisman, M. Gizi dalam Daur Kehidupan (2 ed.). Jakarta: EGC 2010.

[2]. Destarina, R. Faktor risiko anemia ibu hamil terhadap panjang badan lahir pendek di puskesmas sentolo 1 kulon progo di yogyakarta. Gizi indonesia, 41(1), 2018, 39-48.

[3]. Ernawati, F., Rosamalina, Y., & Permanasari, Y. Effect of the pregnant women's protein intake and their baby length at birth to the incidence of stunting among children. The Journal of Nutrition and Food Research, 36(1), 2013, 1-11.

[4]. Indonesia, K. K. R. (2018). Riset kesehatan dasar

[5]. Irawati, A., & Salimar, S. Status Gizi Ibu Sebelum Hamil sebagai Prediksi Berat dan Panjang Bayi Lahir di Kecamatan Bogor Tengah, Kota Bogor: Studi Kohor Prospektif Tumbuh Kembang Anak Tahun 2012-2013. Nutrition and Food Research, 37(2), 2014, 119-128.

[6]. Kementrian Kesehatan, R. Riset kesehatan dasar (Riskesdas) 2013. Jakarta: Badan Penelitian dan Pengembangan Kesehatan 2013.

[7]. Kemiskinan, T. N. P. P. 100 kabupaten/kota prioritas untuk intervensi anak kerdil (stunting). Jakarta: Tim Nasional Percepatan Penanggulangan Kemiskinan 2017.

[8]. Oktaviani, A. C., Pratiwi, R., & Rahmadi, F. A. Asupan protein hewani sebagai faktor risiko perawakan pendek anak umur 2-4 tahun. JURNAL KEDOKTERAN DIPONEGORO, 7(2), 2018, 977-989.

[9]. Organization, W. H. The double burden of malnutrition: policy brief 2016.

[10]. Par'i, M. H., Wiyono S , Harjatmo, T.P. Penilaian Status Gizi. Pusat Pendidikan Sumber Daya Manusia Kesehatan., 2017, 315.

[11]. Pusparini, P., Ernawati, F., Hardinsyah, H., & Briawan, D. Indeks massa tubuh rendah pada awal kehamilan dan defisiensi vitamin A pada trimester kedua sebagai faktor risiko gangguan pertumbuhan linier pada bayi lahir. Jurnal Gizi dan Pangan, 11(3), 2016.

[12]. Rahmadi, A. Hubungan berat badan dan panjang badan lahir dengan kejadian stunting anak 12-59 bulan di Provinsi Lampung. Jurnal Keperawatan, 12(2), 2017, 209-218.

[13]. Rahmawati, A., & Wirawanni, Y. Perbedaan kadar seng (zn) rambut berdasarkan derajat stunting pada anak usia 6–9 tahun. Diponegoro University 2012.

[14]. RI, K. K. Infodatin situasi balita pendek. Jakarta Selatan: Kementerian Kesehatan RI 2016.

[15]. Sastroasmoro, S., & Ismael, S. (2011). Dasar-dasar metodologi penelitian klinis. Jakarta: Sagung Seto, 372.

[16]. Setyawati, B., Barida, I., & Irawati, A. Pengaruh Konsumsi Ibu Hamil Dan Ukuran Biometri Janin Pada Panjang Lahir Bayi (Analisis Data Kohort Tumbuh Kembang Anak 2011-2012). Jurnal Kesehatan Reproduksi, 7(1), 2016, 37-47.

[17]. Susilo, M. T., & Widyastuti, N. Hubungan Kadar Seng (Zn) Rambut dengan Z-score Panjang Badan Menurut Umur (PB/U) Balita Usia 12-24 Bulan. Diponegoro University 2013.

[18]. Tamba Ngom, P., Howie, S., O Ota, M., & M Prentice, A. The potential role and possible immunological mechanisms of zinc adjunctive therapy for severe pneumonia in children. The open immunology journal, 4(1), 2011.

[19]. Trihono, A., Tjandrarini, D., Irawati, A., Utami, N., & Nurlinawati, I. Pendek (stunting) di Indonesia, masalah dan solusinya. Jakarta: Balitbangkes 2015.

[20]. Yustiana, K., & Nuryanto, N. Perbedaan Panjang Badan Bayi Baru Lahir Antara Ibu Hamil KEK dan Tidak KEK. Diponegoro University 2014.