Relationship of temporary blood glucose levels during pregnantcy and baby's birth weight

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ABSTRAK

Latar Belakang *: Kadar gula darah merupakan salah satu faktor yang mempengaruhi berat badan lahir bayi yang menentukan morbiditas dan mortalitas neonatus. Glukosa darah sementara (GDS) meliputi hasil pemeriksaan sesaat suatu hari terlepas dari waktu makan terakhir. Data BBLR tahun 2018 sebanyak 208 bayi mengalami BBLR, 32 bayi mengalami BBLB dan 11 ibu hamil terdiagnosis diabetes gestasional. Pemeriksaan gula darah sering dilakukan untuk mendiagnosis suatu penyakit. Dari hasil studi pendahuluan di RSUD Panembahan Senopati Bantul didapatkan data tentang bayi baru lahir mulai bulan Januari – Desember 2018. Terdapat 208 (9%) bayi mengalami BBLR, 42 (1%) bayi mengalami BBLB, dan 2026 (90%) bayi mengalami BBLR.) bayi lahir normal dan 11 ibu hamil terdiagnosis diabetes gestasional.*
Tujuan *: Mengetahui hubungan kadar glukosa darah sementara saat hamil dengan berat badan lahir bayi di RSUD Panembahan Senopati Bantul.*
Metode *: Jenis penelitian ini adalah analisis kuantitatif dengan pendekatan studi retrospektif. Populasi dalam penelitian ini adalah ibu bersalin di RS Panembahan Senopati Bantul. Metode pengambilan sampel menggunakan nonprobability dengan teknik purposive sampling. Uji statistik menggunakan Spearman.*
Hasil *: Sebagian besar responden berpendidikan SMA (49%), berusia antara 20 - 35 (72%), usia kehamilan atem (80%), Paritas multipara (63%), LILA normal (90%), GDS bukan DM sebanyak (57%), tidak ada riwayat melahirkan bayi besar (82%), berat badan lahir normal (37%), jenis kelamin laki-laki (50%), dan perempuan (50%). Ada hubungan antara kadar glukosa darah sementara saat hamil dengan berat badan lahir bayi di RSUD Panembahan Senopati Bantul menggunakan uji Spearman dengan p-value 0,0001 yang berarti signifikan (<0,05) dan hasil koefisien korelasi (r) = 0,569 yang berarti terdapat korelasi sedang atau cukup.*
Kesimpulan *: Ada hubungan yang signifikan antara kadar glukosa darah sementara selama kehamilan dengan berat badan lahir bayi di RS Panembahan Senopati Bantul.*

KATA KUNCI *: glukosa darah sementara; kehamilan; berat badan lahir bayi*

ABSTRACT

Background : *Blood sugar level is one of the factors that influence to baby's birth weight which determines neonatal morbidity and mortality. Temporary blood glucose (GDS) includes the results of a momentary examination one day regardless of the time of the last meal. Data of baby's birth weight in 2018 are 208 babies having BBLR, 32 babies having BBLB and 11 expectant mother diagnosed with gestational diabetes. Blood sugar check are often performed to diagnose a disease. From the results of the preliminary study at Panembahan Senopati Bantul Hospital, there was data about newborn start from January - December 2018. There were 208 (9%) babies having BBLR, 42 (1%) babies having BBLB, and 2026 (90%) babies born normally and 11 expectant mother diagnosed with gestational diabetes*

Objectives : *Knowing the relationship between temporary blood glucose level during pregnancy and baby's birth weight at Panembahan Senopati Bantul Hospital.*

Methods : *This type of research is quantitative analysis with a retrospective study approach. The population are mothers in labor at Panembahan Senopati Bantul Hospital. The sampling method used nonprobability with purposive sampling technique. Statistical test used Spearman.*

Result : *The majority of respondents had high school education (49%), aged between 20 - 35 (72%), Atem gestational age (80%), Paritas multipara (63%), normal LILA (90%), GDS not DM as much (57%) , there is no history of giving birth to large babies (82%), normal birth weight (37%), male gender (50%), and female (50%). There is a relationship between temporary blood glucose level during pregnancy and baby's birth weight at Panembahan Senopati Bantul Hospital using the Spearman test with a p-value of 0.0001 which means significant (<0.05) and the result of the correlation coefficient (r) = 0.569 which means there is moderate or sufficient correlation.*

Conclusion : *There is a significant relationship between temporary blood glucose level during pregnancy and baby's birth weight at Panembahan Senopati Hospital, Bantul.*

KEYWORD : *temporary blood glucose; pregnancy; baby's birth weight*

INTRODUCTION

Birth weight is weighing that is done in the first hour after the baby is born. Weighing is done to determine whether the baby's birth weight is normal or not. (1). Baby's birth weight in normal normally between 2,500 - 3,999 grams, large babies (macrosomia) ≥ 4,000, and BBLR <2,500 grams (2). Macrosomia baby and BBLR are one of the causes of perinatal morbidity and mortality. The government program has been implemented to detect expectant mother with a high risk of giving birth to macrosomia baby and BBLR with the Antenatal Care Visit (ANC) program, which is the visit of expectant mother at least 4 times during pregnancy with the aim of minimizing unexpected impacts (3). In accordance with Darmuki and friends research, some expectant mother made ANC visits according to K4, namely 81.1% and mothers who gave birth to BBLR and did not amount to 66 (50%) with the result that there was a relationship between ANC frequency and BBLR incidence with p value = 0.001 (4).

The infant mortality rate (AKB) in Indonesia is 23 per 1000 live births. AKB Yogyakarta Special Region (DIY) is at 25 per 1000 live births. Common causes of infant mortality in DIY are low birth weight (BBLR) and sepsis. Meanwhile, BBLR is babies born <2,500 grams (Ministry of Health, 2009). One of the indicators that can be assessed as an effect of baby's birth weight is the mother's glucose level. Various kinds of blood sugar check, one of which is temporary blood glucose check. Temporary Blood glucose (GDS) includes the results of a momentary examination on a day regardless of the time of the last meal. GDS category based on Konsensus Parkeni 2011 is non-DM: <90 mg / dL, uncertain DM: 90 - 199 mg / dL, DM:> 200 mg / dL.

Blood sugar checks are often done to diagnose a disease. Blood sugar that is more than the normal limit has the risk of a person suffering from diabetes mellitus, Diabetes mellitus (DM) or simply diabetes is a chronic metabolic disorder caused by the pancreas not

producing enough insulin or the body unable to use the insulin is being produces effectively. Insulin is a hormone that regulates the balance of blood glucose levels which results in an increase concentration of glucose in the blood (hyperglycemia) (4).

Gestational diabetes is diabetes that occurs in the mother only during pregnancy. This disease occurs during pregnancy due to hormonal changes in the body of expectant mother, thereby increasing insulin resistance. The hormone insulin is a substance that processes sugar circulating in the blood to be metabolized in a form that is easily utilized by the body. When these hormones are reduced, sugar that comes from food and that is produced by the body will accumulate in the bloodstream. If the occupancy exceeds the limit, the person will be said to have diabetes mellitus. A person is said to have gestational diabetes if excess blood glucose levels occur only during pregnancy. After passing the pregnancy period, usually the blood sugar will return to normal (5).

A preliminary study conducted by researcher in February 2019 at Panembahan Senopati Hospital, 2276 babies born in 2018, 208 (9%) babies had Low Birth Weight (BBLR), 42 (1%) babies had Overweight (BBLB / Macrosomia), 2036 (90%) babies born normal and 11 expectant mother diagnosed with gestational diabetes.

The update in this study is that all complete data on pregnant women in the hospital in the last one year were taken, not only mothers who had high blood glucose levels, so that outcomes or babies could be analyzed when they were born with a baby's weight.

MATERIALS AND METHODS

The type of research in this research is quantitative analytic with a retrospective study approach. This research was conducted at Panembahan Senopati Bantul Hospital, on 28 May - 10 June 2019 in the medical record room. The population in this study were mothers giving birth at Panembahan Senopati Hospital and the sample in this study amounted to 128 mothers giving birth in the last 1 year (2018), with the independent variable (independent) temporary blood glucose during pregnancy and the dependent (dependent) in this study was baby's birth weight. The inclusion criteria were mothers who had temporary blood glucose level when they were last checked before childbirth and there were anthropometric measurement data for babies in the form of baby's birth weight. The exclusion criteria for mothers in labor who did not have complete data such as data on temporary blood glucose level and anthropometric measurements of babies in the form of baby's birth weight (6).

Statistical test used Spearman. Number EC: KE/AA/V/506/EC/2019 di Universitas Alma Ata.

RESULT AND DISCUSSION

Respondent Characteristic at Panembahan Senopati Bantul Hospital

Descriptive result of respondent characteristics, the majority in this study were the majority of mothers with high school education (49%), the dominant age of the mothers was 20-35 years (72%), most of the mothers' gestational age was Aterm (80%), Paritas multipara (63%), LILA normal (90%), the majority of mothers with GDS are not diabetes (57%) and mothers do not have a history of giving birth to large babies (82%).

Based on Ghita K's research (2018) there is a relationship between chronic energy deficiency and the incidence of baby's low birth weight at Public Health Center of Sedayu 1 with contingency coefficient value of 0.406, namely KEK in expectant mother has a moderate closeness to the incidence of BBLR (7). It is accordance with Kurniawati R.S.D's research state that expectant mother who suffer from KEK

Tabel 1. Characteristic Respondent

Characteristic	Frequency	%
Education		
Bachelor	6	4
Diploma	6	4
Senior High School	62	49
Junior High School	34	27
Primary school	20	16
Total	128	100%
Age		
< 20 Year	6	5
20 - 35 Year	92	72
>35 Year	30	23
Total	128	100%
Gestational Age		
Pre term	25	20
Aterm	103	80
Post term	0	0
Total	128	100%
Parity		
Primipara	45	35
Multipara	80	63
Grandepara	3	2
Total	128	100%
Upper arm circumference		
chronic energy deficiency	12	10
Normal	116	90
Total	128	100%
Blood Glucose Levels		
No DM	73	57
Uncertain DM	44	34
DM	11	9
Total	128	100%
History of childbirth with large babies		
Yes	23	18
No	105	82
Total	128	100%
Baby Birth Weight		
Low birth weight	39	30
Normal	47	37
Makrosomia	42	33
Total	128	100%
Gender		
Male	64	50
Female	64	50
Total	128	100%

Source: Secondary Data 2018

have a 9,281 times greater risk of giving birth to BBLR babies than those who do not suffer from KEK (8). Based on research by Biratu et al., the sex of the child, previous history of fetal macrosomia and gestational age are associated with the birth of a macrosomic baby with male results. Men (AOR = 2.2.95% CI 1.1-4.2, ≥ 37 weeks of gestational age (AOR = 6.0.95% CI 3.1-11.1) and have a history of previous macrosomia (AOR = 14.5.95% CI = 7.2 -29.2). (9) In line with research of Mengesha et al (2017) stated that gestational age and neonatal sex are common risk factors for baby's low birth weight and macrosomia (10).

In this study, it was found that most of the babies born were in the normal category (37%). Based on the research of Setiariza R, the majority of baby's birth weight are in the normal category with the result that there is a significant relationship between maternal age and maternal parity with the incidence of low birth weight in RSUD Sleman Yogyakarta (11). Those result of Setiariza R are not in line with the research of Permana Putri A.I and friends. The result of Permana Putri A.I and friends stated that there was no significant relationship between maternal age (p value = 0.078), parity (p value = 0.705) and pregnancy spacing (p value = 0.819) with the incidence of baby's low birth weight (BBLR) in Bantul district in 2012.

Relationship of Temporary Blood Glucose Level during pregnancy with the baby's birth weight at Panembahan Senopati Bantul Hospital.

From the result of the spearman rank test analysis with a p-value of 0.0001 which means significant (<0.05) and shows a sufficient correlation (r = 0.569) which indicates that there is an adequate or moderate relationship between temporary blood glucose level during pregnancy and baby's birth weight at Panembahan Senopati Bantul Hospital. The results of this study are consistent with research conducted by Monique (2006) using cases and controls by dividing glucose level into 2 groups, namely normal glucose level (<140mg / dl) and, abnormal (> 140mg / dl). Those results of the study concluded that infants with baby's in large birth weight, the majority of baby were born to expectant mother

Tabel 2. Relationship of Blood Glucose Levels during pregnancy at Panembahan Senopati Bantul Hospital.

			Blood sugar level	Baby's birth weight
Spearman's rho	Temporary blood glucose level	Correlation coefficient	1.000	.569**
		sig. (2-tailed)	.	.000
		N	128	128
	Baby's birth weight	Correlation coefficient	.569**	1.000
		sig. (2-tailed)	.000	.
		N	128	128

with high blood sugar level that exceed the normal recommended by the Institute of Medicine (IOM), namely> 140 mg / dl, so that there is a significant relationship between blood sugar level and baby's birth weight (11). Complications of pregnant women who have diabetes mellitus tend to give birth to large babies (macrosomnia) (17)

This relationship is in accordance with the research conducted by Vadeketut E, S (2011) that serum glucose during pregnancy can be a causative factor for baby's birth weight. The results showed that the highest percentage of infants with baby's low birth weight was found in the group of mothers with low blood glucose level compared to the group of mothers with normal blood glucose level. In addition, the group of mothers with high blood sugar level had the highest percentage of the incidence of baby with large birth weight (12). This occurs because the source of energy and nutrition in fetal growth is obtained from the placenta, which controls glucose, fat and transplacental protein, which played a major role is changing carbohydrate metabolism and maternal weakness (Ozcimen, et al., 2008). (13)

Characteristics based on the results of the cross table test

Baby's birth weight based on mother's education

Based on the educational characteristics of respondents at Panembahan Senopati Bantul Hospital, the majority of respondents (61 respondents) had high school education level. 22 respondents among them (36.1%) had baby weight in the BBLR category, 21 respondents (34.4%) had normal weight and 18 respondents (29.5%) had overweight. The results of this study are not accordance with research conducted by Vitrianingsih, et al (2015) on "Maternal Factors Related to Birth Weight" which states that education is related to BBLR incidence, mothers with basic education will have three times greater chance of giving birth to BBLR compared with highly educated mothers.

Baby's birth weight based on mother's age

Based on age characteristics, the majority of respondents having aged between 20-35 years old were 94 respondents, 32 respondents of them (34.0%) had low body weight, 36 respondents (38.3%) had normal weight and 26 respondents (27.7%) had overweight (macrosomnia). This result is in accordance with the research described by Minoo, et al (2010) that the incidence of baby's low birth weight (BBLR) is more common in mothers with the young age category (<20 years) related to their immature psychological status, especially in decision making.

Baby weight based on gestational age

The results of this study indicate that the majority of respondents with aterm gestational age are 111 respondents. 25 respondents (22.5%) of them have babies with low birth weight category. 47 respondents (42.3%) of them have babies with normal weight category and 39 respondents (35.1%) have overweight

<p style="text-align:center">Tabel 3. Characteristics based on the results of the cross table test</p>

Category	Baby Birth Weight						Σ	
	Low birth weight		Normal		Macrosomnia			
	F	%	f	%	f	%	f	%
Educatioan								
Primary School	4	20,0	8	40,0	8	40,0	20	100,0
Junior High School	14	41,2	12	35,3	8	23,5	34	100,0
Senior high School	22	36,1	21	34,4	18	29,5	61	100,0
Diploma	1	16,7	2	33,3	3	50,0	6	100,0
Bachelor	1	16,7	3	50,0	2	33,3	6	100,0
Magister	0	0,0	1	100	0	0,0	1	100,0
Total	42	32,8	47	36,7	39	30,5	128	100,0
Age								
<20	2	33,3	3	50,0	1	16,7	6	100,0
20-35	32	34,0	36	38,3	26	27,7	94	100,0
>35	8	28,6	8	28,6	12	42,9	28	100,0
Total	42	32,8	47	36,7	39	30,5	128	100,0
Gestational Age								
Preterm	17	100,0	0	0,0	0	0,0	17	100,0
Aterm	25	22,5	47	42,3	39	35,1	111	100,0
Posterm	0	0,0	0	0,0	0	0,0	0	0,0
Total	42	32,8	47	36,7	39	30,5	128	100,0
Parity								
Primipara	15	33,3	20	44,4	10	22,2	45	100,0
Multipara	27	33,8	27	33,8	26	32,5	80	100,0
Grandepara	0	0,0	0	0,0	3	100,0	3	100,0
Total	42	32,8	47	36,7	39	30,5	128	100,0
Upper arm circumference								
chronic energy deficiency	5	41,7	4	33,3	3	25,0	12	100,0
Normal	37	31,9	43	37,1	36	31,0	116	100,0
Total	42	32,8	47	36,7	39	30,5	128	100,0
Blood Glucose Levels								
No DM	37	50,7	28	38,4	8	11,0	73	100,0
Uncertain DM	5	11,4	19	43,2	20	45,5	44	100,0
DM	0	0,0	0	0,0	11	100,0	11	100,0
Total	42	32,8	47	36,7	39	30,5	128	100,0
History of childbirth with large babies								
No	42	40,0	47	44,8	16	15,2	105	100,0
Yes	0	0,0	0	0,0	23	100,0	23	100,0
Total	42	32,8	47	36,7	39	30,5	128	100,0
Gender								
Female	24	37,5	30	46,9	10	15,6	64	100,0
Male	18	28,1	17	26,6	29	45,3	64	100,0
Total	42	32,8	47	36,7	39	30,5	128	100,0

babies (macrosomnia). The results of this study are in accordance with the Indonesian Ministry of Health (2005) which states that the more sufficient the gestation period the better the baby's welfare. Besides, the general condition and nutrition of the mother during pregnancy also greatly affects the welfare of the baby.[5]

Baby's birth weight based on parity.

The results showed that the majority of respondents were multiparous mothers. There are 80 people as multiparous mothers that divided some categories. 27 people (33.8%) had babies with low body weight, 27 people (33.8%) had babies with normal weight and 26 people (32.5%)

had babies with overweight. (macrosomnia). The results of this study are not in accordance with the theory contained in the research of Wahyuningrum, et al (2015) which states that when viewed from parity, it is found that the higher parity, the higher the baby's birth weight, with the number of parity not more than 3.

Baby's birth weight based on LILA

Based on the research, it shows that the majority of mother (116 people) had normal LILA. The majority of mother also had baby's birth weight normal and 31% of mothers gave birth to babies with macrosomia. This research is not in accordance with the research by Ayu Rahma P & Al Muqsith which state that the incidence of BBLR in mothers with LILA <23.5 cm is greater, namely 42.9% compared to mothers with normal LILA> 23.5 cm, namely 6.4%. The results of the analysis of the Chi-Square Staristic test showed that there was a significant relationship between the upper arm circumference of pregnant women and baby's birth weight with a significance value of p valae = 0.006[6.]

Baby weight based on GDS

Based on the results of the study, the majority of respondents with GDS results not yet DM were 73 people. There were 37 people (50.7%) that had baby's low birth weight, 28 people (38.4%) had baby's normal birth weight and more than 8 people (11.0%) had overweight. Research by Vadeketut E, S (2011) explains that serum glucose during pregnancy can be causative factor for birth weight. The results showed that the highest percentage of infants with low birth weight was found in the group of mothers with low blood glucose level compared to the group of mothers with normal blood glucose level. In addition, the group of mothers with high blood sugar level had the highest percentage of the incidence of large birth weight (12). This occurs because the source of energy and nutrition in fetal growth is obtained from the placenta, which controls glucose, fat and transplacental protein, which play a major role. is changing carbohydrate metabolism and maternal weakness (Ozcimen, et al., 2008) .[13]

Baby's birth weight based on history of macrosomia

The results explained that the majority of respondents (105 people) did not have a history of giving birth to macrosomniac babies. From 105 people, 42 people (40.0%) having low birth weight babies, 47 people (44.8%) having normal weight babies, 16 people (15.2%) having over birth weight (macrosomia) babies and there are 23 people (100%) who have a history of giving birth to large babies will give birth to a large baby (macrosomia). In accordance with Ai Yeyeh's theory that if a mother has a history of giving birth to a macrosomic baby, so she has a 5-10 times higher risk of having a macrosomic baby than a woman who has never given birth to a macrosomic baby. In general, the weight of a baby to be born next will increase by around 80-120 g. Large babies are more common in mothers who have given birth more frequently (multiparous) compared to first pregnancies. So, ANC examination is very important to be carried out by expectant mother to improve the health status of expectant mother.[16]

Baby's birth weight based on sex

The results showed that there were 42 mothers (32.8%) with low birth weight babies consisting of 24 women (37.5%), 18 boys (28.1%); 47 mothers (36.7%) with normal birth weight babies consisting of 30 women (46.9%) and 17 boys (26.6%); and 39 mothers (30.5%) with overweight babies consisting of 10 women (15.6%) and 29 boys (45.3%). Jazayery in Akin et al (2010) states that male babies usually will be born with heavier weight than female babies, and this proportion will be greater in babies born weighing 4500 grams regardless of gestational age.

CONCLUSION AND RECOMMENDATION

There is an adequate or moderate relationship between temporary blood glucose level during pregnancy with baby's birth weight at Panembahan Senopati Bantul Hospital with a p-value of 0.0001 which means significant (<0.05) and the correlation coefficient (r) = 0.569 which means that there is a moderate or sufficient correlation.

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