COMPARISON OF SERUM PROGESTERONE LEVEL IN PRETERM LABOR AND NORMAL PREGNANCY

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Abstract : This research is supposed to compare the progesterone serum level between women with preterm labor and normal pregnancy. This is an analytical study with cross sectional design to compare between serum progesterone level in preterm labor and normal pregnancy. Population are pregnant women in delivery room and outpatient clinic of obstetric and gynecology department at RSUP H Adam Malik and FK USU satellite hospitals in Medan . The sample of this study arepart of population which has fullfilled the inclusion and exclusion criteria, collected with consecutive sampling. Matching of gestational age was performed on sample and control group. From this study, 46 subjects were obtained, which divided equally between 2 groups, with preterm labor and normal pregnancy. Mean level of progesterone in preterm labor group is 103,22 ng/ml, lower if compared to normal pregnancy group with 200,22 ng/ml (p-value = 0,0001). Progesterone serum level in pregnant women with preterm labor is significantly lower compared to normal pregnancy.

Keyword: Preterm Labor, Progesterone.

I.   INTRODUCTION

According to the results of Indonesian Health Demographic Survey in 2012, Neonatal Mortality Rate in Indonesia was 19 deaths / 1000 live births and Infant Mortality Rate was 32 deaths / 1000 live births. Among all neonatal deaths, 75% occur in the first week of life, and of those deaths, 25-45% occur within 24 hours of life. The main causes of neonatal death are prematurity, low birth weight, infections, asphyxia, labor trauma and congenital abnormalities.[1] Preterm labor is usually defined regular contractions which accompanied by changes in the cervix that occur at less than 37 weeks' gestation. Spontaneous preterm labor occurs as much as 40-50% in preterm labor, and the remaining 25-40% results from preterm premature rupture of membrane (PPROM) and 20-25% preterm labor due to obstetric indications.[2]

There are several theories regarding the initiation of labor, including; (1) decrease in progesterone levels, (2) oxytocin initiation, and (3) preterm activation of decidua.[2] Progesterone has a role in maintaining pregnancy and is thought to act by suppressing the activity of smooth muscle in the uterus.[3,4,5,6,7]

Stamatelou et al found an average progesterone concentration that was 30% lower in women with preterm labor with 28-34 weeks' gestation when compared to women giving birth at term.[8] Firdianti et al, showed serum progesterone induced blocking factor (PIBF) levels in preterm labor were lower than at term labor, which the differences of PIBF levels was significant (p = 0.001) with serum PIBF levels in preterm labor (355.44 ng / ml ± 106.15) lower than term delivery (490.52 ng / ml ± 153.30).[9]

II.   RESEARCH METHODOLOGY

This research is an analytic study with cross sectional design to determine the comparison of serum progesterone levels in preterm labor and normal pregnancy performed in the delivery room and polyclinic Obstetrics and Gynecology in H. Adam Malik General Hospital and Network Hospital of Medical Faculty, University of North Sumatera in Medan, then examination of serum progesterone levels was conducted at Gatot Subroto Laboratory in Medan.

This research was conducted from May 2014 until the minimum sample size was met. The research sample was 20 people for each group selected by consecutive sampling with inclusion criteria which is preterm birth women with 28-36 weeks gestation who gave birth spontaneously or cesarean section (with obstetric indications) as a case, normal pregnant women with 28-36 weeks gestation who were not in labor as a control, singleton pregnancy, willing to participate in the study and sign an agreement to participate in the study, and exclusion criteria which is iatrogenic preterm labor: Solusio Placenta, Placenta Previa, Preeclampsia, Eclampsia, HELLP Syndrome, IUGR, Gemelli, Fetal Anomaly, Diabetes Mellitus, Chorioamnionitis (infection), history of using progesterone drugs and not willing to participate in research. Then the research subjects between cases and controls were matched by gestational age.

After signing the affidavit willing to follow the research. All patients were undergoing anamnesis (name, age, address, parity, first day of last menstruation), physical examination (awareness, blood pressure, pulse frequency and breathing for 1 minute, body temperature), venous blood sampling as much as 3 cc and blood examination for serum progesterone in Gatot Subroto laboratory using ELISA (enzyme linked immunosorbent assay) method. Patients were managed according to the applicable services at H. Adam Malik General Hospital and Network Hospital of Medical Faculty, University of North Sumatera in Medan and the cost of examining serum progesterone levels was borne by the researchers.

The data obtained is tabulated and presented in the form of a frequency distribution table. To analyze the differences between variables, a statistical test by t-test with a 95% confidence level was performed.

III. RESULTS AND DISCUSSIONS

Serum progesterone levels were examined in preterm and normal pregnancy patients at H. Adam Malik General Hospital Medan and Network Hospital of Medical Faculty, University of North Sumatera from May 2014 to July 2014. There were 23 cases of preterm birth patients as a study group and 23 normal pregnancies as a group control.

Table 1. Characteristics Research Subjects

Characteristics	Preterm Labor		Normal Pregnancy		P value
	N	%	N	%	
Age (years)					
• <20	2	8,7%	1	4,3%	
• 20-24	1	4,3%	3	13,1%	
• 25-29	10	43,5%	11	47,8%	0,797
• 30-35	8	34,8%	6	26,1	
• >35	2	8,7%	2	8,7%	
Parity					
• Primigravida	14	60,9%	8	34,8%	
• Secundigravida	3	13,1%	4	17,4%	
• Multigravida	5	21,7%	11	47,8%	0,170
• Grandemultigravida	1	4,3%	0	0%	
Gestational Age					
• 28	1	4,3%	1	4,3%	
• 29	1	4,3%	1	4,3%	
• 30	1	4,3%	1	4,3%	
• 31	0	0%	0	0%	
• 32	3	13%	3	13%	
• 33	1	4,3%	1	4,3%	
• 34	4	17,4%	4	17,4%	
• 35	4	17,4%	4	17,4%	
• 36	8	34,8%	8	34,8%	
Total	23	100	23	100	

From table 1, based on the characteristics of the mother's age, it is found that in preterm birth group, mostly from 25-29 years age group with 10 people (43.5%), while in the normal pregnancy group mostly from the 25-29 year age group with 11 people (47.8%). From statistical test, p value = 0.797 which indicates there is no significant relationship between the characteristics of maternal age with the incidence of preterm labor.Based

on parity, mostly found primigravida in the preterm labor group with 14 people (60.9%), while in normal pregnancy group mostly multigravida as many as 11 people (47.8%). From the statistical test results, p value = 0.170 which indicates there is no significant relationship between parity characteristics with the incidence of preterm labor. Based on the gestational age found in both preterm birth group and normal pregnancy group mostly 36 week gestational age group with 8 people (34.8%), respectively.

Table 2. Characteristics of Duration, Cervical Dilation on Arrival at Hospital, Birth Weight, Apgar score minute-1 and Apgar score minutes-5 on Preterm Labor

Characteristics	Preterm Labor	
	N	%
Labor Duration		
1	3	13%
2	7	30,4%
3	4	17,4%
4	1	4,3%
5	2	8,7%
6	0	0%
7	1	4,3%
8	3	13%
9	0	0%
10	1	4,3%
11	0	0%
12	1	4,3%
Cervix dilation		
1	1	4,3%
2	2	8,7%
3	3	13%
4	4	17,4%
5	2	8,7%
6	7	30,4%
7	1	4,3%
8	3	13%
9	0	0%
10	0	0%
Birth Weight		
<1500	3	6,5%
1500-1750	2	4,3%
1750-2000	2	4,3%
2000-2250	4	8,7%
2250-2500	8	17,4%
>2500	4	8,7%
APGAR SCORE (minute-1)		
0-3	6	13%
4-6	10	21,7%
7-10	7	15,2%
APGAR SCORE (minute-5)		
0-3	1	2,2%
4-6	7	15,2%
7-10	15	32,6%
Total	23	100%

The table above explains that the research subjects in preterm labor group were mostly born within 2 hours (30.4%). Based on the cervix dilation it was found that preterm labor group was mostly born with an opening of 6 cm (30.4%). Based on the weight of newborns showed that mostly preterm labor group was between 2250 gr

- 2500 gr (17.4%). Based on the Apgar score minute-1 shows that mostly preterm delivery group between 4-6 (30.4%) while in 5 minute shows that mostly between 7- 10 (32.6%).

Table 3. The Average Duration of Labor and Cervical Dilation in Preterm Labor Since Hospitalization

	Persalinan Preterm (n=23)	
	Mean	SD
Duration (jam)	4,17	3,143
Dilation (cm)	4,91	1,998

The table above shows, the mean duration of delivery for preterm labor was 4.17 with SD = 3.143, while the mean cervical dilation for preterm birth was 4.91 with SD = 1.998

	Progesteron Level		
	X	SD	P value
Preterm Labor	103,22	54,010	0,0001
Normal Pregnancy	200,22	49,768	

*t-test

Based on the table above, it can be seen that mean value of progesterone in preterm labor was 103.22 ng / ml which is lower than normal pregnancies which have a mean progesterone level of 200.22 ng / ml. To find out the differences in the mean levels of progesterone from the two groups, a statistical test was performed with a t-test that obtained a p value <0.05 which showed a significant difference in the progesterone levels of the preterm and normal pregnancy groups.

This is in accordance with the results of previous study by Stamatelou et al, who found mean concentration of progesterone to be 30% lower in women with preterm labor with 28-34 weeks gestational age when compared to women giving birth at term. They also found that women with preterm labor had lower levels of progesterone during the active phase compared to women with aterm labor.[9]

This is in accordance with the "see-saw" theory by Csapo, which states that progesterone has implications in the mechanism of labor in humans (term and preterm) with different outputs. The adequate concentration of progesterone in the myometrium can compensate for the activity of prostaglandin stimulation along with the ability of oxytocin to increase the activity of histamine agonists. Progesterone will reduce the concentration of myometrial oxytocin receptors, which will offset the effects of estrogen. Progesterone also inhibits prostaglandin production by amnion-chorion-decidua and increases the bond between progesterone and fetal membrane at term, which may explain the predominant effect of estrogen in increasing prostaglandin production and triggering labor.[10]

IV. CONCLUSION

The mean value of progesterone levels in preterm labor is lower than normal pregnancies and statistical tests with t-tests showed p values <0.05 which indicate a significant difference in the levels of progesterone in preterm labor groups and normal pregnancies.

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