OBSTETRICS

Comparison of Risk Factors and Outcome of Delivery between Preterm and Term Delivery: 1-Year Study (2008 BE) at Siriraj Hospital

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ABSTRACT

Objective: To assess the risk factors and outcome of delivery between preterm and term delivery at Siriraj Hospital during 2008.

Materials and methods: During January to December 2008, 331 pregnant women who had at least one risk factor for preterm delivery were included in this study. An epidemiologic study exploring possible risk factors for preterm delivery was undertaken. The patient who had at least one risk factor was followed up until delivery. The gestational age at delivery, newborn body weight, sex and APGAR score were recorded. The tests including descriptive analysis by SPSS 11.5, Continuity Correction, Fisher's exact and Pearson Chi-square test, were used to analyze the data.

Results: From 1,024 of new pregnant women who came for antenatal care at Siriraj Hospital, 331 pregnant women had at least one risk factor for preterm delivery. Eighty three cases (25.1%) delivered during 24-37 weeks and 240 cases delivered after 37 weeks. Pregnant women with preterm delivery were 25 ± 7.8 (15-42) years old and had body mass index (BMI) of 23.36 ± 3.71 (17.0 - 34.2). Pregnant women with term delivery were 28.8 ± 7.7 (13-43) years old and had BMI of 24.12 ± 2.78 (16.5 – 35.1). Most pregnant women had the education lower than high school and much stress during pregnancy, but they were not significantly different in statistics. No evidence of all risk factors during pregnancy was associated with preterm delivery.

Conclusion: No definite risk factor was associated with preterm delivery in this study.

Keywords: preterm delivery, risk factors, outcome

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Introduction

Preterm labor and delivery are still the leading causes of high perinatal and neonatal morbidity and mortality. Premature infants are at greater risk for short and long term complications, including disabilities and impediments in growth and mental development. Many risk factors were identified to prevent preterm labor and delivery. Many interventions were initiated to help prevent the complications. However, many risks factors have been difficult to prove and most of preterm births are delivered from the pregnant women without risk factors. The objective of this study is to identify the associated risk factors for preterm delivery which would be the preliminary study for future intervention to prevent preterm labor and delivery at Siriraj Hospital.

Materials and Methods

This study was approved by the Ethics Committee of Faculty of Medicine, Siriraj Hospital, Mahidol University.

This was a prospective descriptive study. During January to December 2008, 331 pregnant women who had at least one risk factor for preterm delivery were included in this study. An epidemiologic study exploring possible risk factors for preterm delivery was undertaken. The demographic characteristics including maternal age, pre-pregnancy weight, education and socioeconomic status were recorded. The obstetrics history of risk factors including history of preterm delivery, second trimester pregnancy loss, medical and obstetrics complication, characteristics of antenatal care and history of preterm premature rupture of membranes were identified. The demographic data, gestational age of delivery and newborn bodyweight were recorded. Other factors including multifetal pregnancy, vaginal bleeding after 12 weeks of gestation, systemic infection, urinary tract infection and genital tract infection, life style issues (smoking, stress, physical activity and work), anemia, cervical and uterine factors and fetal factors were also recorded. The patient who has at least one risk factor was followed up until delivery. The gestational age at delivery, newborn body weight, sex and APGAR score were analyzed. The tests including descriptive analysis by SPSS 11.5, Continuity Correction, Fisher's exact and Pearson Chi-square test were used to analyze the data.

Definitions

* Low socioeconomic status = Pregnant woman who has income less than 12,000 bahts per month.
* Smoking = Pregnant woman who smokes at least one cigarette per day.
* Stress = Pregnant woman who feels much embarrassing and uncomfortable in her daily life and need consultation.
* High physical activity and work hard = Pregnant woman who works more than 8 hours per day
** Anemia = Pregnant woman who has hemoglobin less than 11 mg/dl.
* Definition by Siriraj committee of this project number 070G00006/041/07
** Clinical Practice Guideline: management of thalassemia in pregnancy, Siriraj Hospital, 2007

Results

A total of 1,024 new pregnant women who came for antenatal care at Siriraj Hospital during 2008, 331 cases had at least one risk factor for preterm delivery. After follow up all risk pregnant women (331 cases) until delivery, 83 (25.1%) pregnant women delivered during 24-37 weeks, 8 (2.4%) pregnant women had pregnancy loss during gestational age less than 24 weeks and the remaining, 240 (72.5%) cases delivered after 37 weeks of gestation. (Table 1)

Eighty three pregnant women with preterm delivery were 25 ± 7.8 (15-42) years old and had body mass index (BMI; mean $\pm$ SD) of 23.36 ± 3.71 kgs/m^2 (17.0 - 34.2). Two hundred and forty women with term delivery were 28.8 ± 7.7 (13 - 43) years old and had BMI of 24.12 ± 2.78 kgs/m^2 (16.5 – 35.1). All of 83 pregnant women who had preterm delivery had at least one risk factor for preterm delivery, but no any risk factor was significantly associated with preterm delivery as the result in Table 2. Most pregnant women with preterm delivery had the education lower than high school and had more stress during pregnancy, but were not significant difference in statistics. Both preterm and term delivery groups had no statistical significant in route of

delivery, newborn sex and APGAR score. There was statistical significant in the groups of newborn body weight less than 2,000 grams and more than 3,000 grams. (Table 3)

Table 1. Number of pregnant women with pregnancy loss and delivery are presented

Gestational age (weeks of gestation)	Number	Percent
<24	8	2.4
24-37	83	25.1
>37	240	72.5
Total	331	100

Table 2. Comparison of baseline characteristics and associated risk factors between preterm and term delivery

Associated risk factors	Numbers of pregnant women (N=323)		P-value
	24-37 weeks of gestation (N = 83)	>37 weeks of gestation (N = 240)	
DEMOGRAPHIC CHARACTERISTICS			
● maternal age < 17 years or > 35 years			
■ positive risk factor	22 (26.5%)	49 (20.4%)	0.640
■ negative risk factor	61 (73.5%)	191 (79.6%)	
● pre-pregnancy weight < 45 kg.			
■ positive risk factor	4 (4.8%)	13 (5.4%)	0.349
■ negative risk factor	79 (92.8%)	227 (94.6%)	
● body mass index (BMI)			
< 20 kg/m^2			
■ positive risk factor	3 (3.6%)	6 (2.5%)	0.518
■ negative risk factor	80 (96.4%)	234 (97.5%)	
> 32 kg/m^2			
■ positive risk factor	3 (3.6%)	8 (3.3%)	0.418
■ negative risk factor	80 (96.4%)	232 (96.7%)	
● education			
Lower than high school			
■ positive risk factor	40 (48.2%)	93 (38.8%)	0.913
■ negative risk factor	43 (51.8%)	147 (61.2%)	
● Primary	24 (28.9%)	52 (21.7%)	
● Secondary	16 (19.3%)	41 (17.1%)	
● High school	40 (48.2%)	15 (6.2%)	
● Postgraduate	3 (3.6%)	132 (55%)	
● Low socioeconomic status			
■ positive risk factor	14 (16.9%)	79 (33%)	0.349
■ negative risk factor	69 (83.1%)	161 (67%)	

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OBSTETRIC HISTORY

- History of preterm birth

positive risk factor	6 (7.2%)	15 (6.2%)	0.567
negative risk factor	77 (92.8%)	225 (93.8%)	

- History of second trimester pregnancy loss

positive risk factor	6 (7.2%)	17 (7%)	1.000
negative risk factor	77 (92.8%)	223 (93%)	

- Medical and obstetrics complication during pregnancy

positive risk factor	4 (4.8%)	10 (4.2%)	0.460
negative risk factor	79 (92.8%)	230 (95.8%)	

- Poor and late antenatal care

positive risk factor	1 (1.2%)	4 (1.7%)	
negative risk factor	82 (98.8%)	236 (98.3%)	0.395

- Preterm premature rupture of membranes

positive risk factor	2 (2.4%)	3 (1.2%)	0.724
negative risk factor	81 (97.6%)	237 (98.8%)	

MULTIFETAL GESTATION

positive risk factor	2 (2.4%)	2 (0.8%)	0.393
negative risk factor	81 (97.6%)	238 (99.2%)	

VAGINAL BLEEDING AFTER 12 WEEKS OF GESTATION

positive risk factor	6 (7.2%)	8 (3.3%)	0.806
negative risk factor	77 (92.8%)	232 (96.7%)	

INFECTION

- Systemic — 1.000

positive risk factor	1 (1.2%)	2 (0.8%)	
negative risk factor	82 (98.8%)	238 (99.2%)	

- Urinary system

positive risk factor	3 (3.6%)	12 (5%)	0.779
negative risk factor	80 (96.4%)	228 (95%)	

- Genital tract

positive risk factor	4 (4.8%)	7 (2.9%)	0.692
negative risk factor	79 (95.2%)	233 (97.1%)	

LIFESTYLE ISSUES			
• High physical activity and work hard			
▪ positive risk factor	5 (6%)	12 (5%)	0.779
▪ negative risk factor	78 (94%)	228 (95%)	
• Smoking			
▪ positive risk factor	3 (3.6%)	1 (0.4%)	1.000
▪ negative risk factor	80 (96.4%)	239 (99.6%)	
• Stress			
▪ positive risk factor	12 (14.5%)	9 (3.7%)	1.000
▪ negative risk factor	71 (85.5%)	231 (96.3%)	
CERVICAL AND UTERINE FACTORS			
• Uterine myoma			
▪ positive risk factor	1 (1.2%)	3 (1.2%)	1.000
▪ negative risk factor	82 (98.8%)	237 (98.8%)	
ANEMIA			
▪ positive risk factor	4 (4.8%)	8 (3.3%)	0.686
▪ negative risk factor	79 (95.2%)	232 (96.7%)	
FETAL FACTORS			
• congenital anomaly			
▪ positive risk factor	1 (1.2%)	2 (0.8%)	0.928
▪ negative risk factor	82 (98.8%)	238 (99.2%)	
• intrauterine growth restriction			
▪ positive risk factor	2 (2.4%)	3 (1.2%)	0.460
▪ negative risk factor	81 (97.6%)	237 (98.8%)	

Table 3. Comparison the outcome of delivery between preterm and term.

Outcome of delivery	Numbers of pregnant women (N=323)		P-value
	24-37 weeks of gestation (N = 83)	> 37 weeks of gestation (N =240)	
route of delivery			
• normal vaginal delivery	48 (57.8%)	178 (74.2%)	0.714
• vacuum extraction	1 (1.2%)	7 (2.9%)	0.653
• cesarean section	34 (41%)	55 (22.9%)	0.729
newborn body weight (grams)			
• < 2,000	12 (14.5%)	1 (0.4%)	<0.05*
• 2,000 – 2,500	19 (22.9%)	10 (4.2%)	0.250
• 2,501 – 3,000	37 (44.6%)	82 (34.1%)	0.330
• > 3,000	15 (18.0%)	147 (61.3%)	<0.05*

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newborn sex			
• male	45 (54.2%)	122 (50.8%)	0.453
• female	38 (45.8%)	118 (49.2%)	0.685
APGAR score			
• at 1 minute			1.000
▪ 0-4	5 (6.0%)	2 (0.8%)	
▪ 5-7	7 (8.5%)	12 (5%)	
▪ 8-10	71 (85.5%)	226 (94.2%)	
• at 5 minute			1.000
▪ 0-4	3 (3.6%)	3 (1.3%)	
▪ 5-7	2 (2.4%)	10 (4.2%)	
▪ 8-10	78 (94%)	227 (94.5%)	

* statistical significance

Discussion

Risk factors for preterm delivery were studied. From this study, no any risk factor was statistical significant for preterm delivery. Previous preterm delivery is the strongest risk factor for subsequent preterm delivery.[1] In contrary to this study that most women with previous preterm delivery had subsequent pregnancies of normal term delivery.

Maternal age, race, and marital and economic status were the risks for preterm delivery. Both teenage and women 35 years of age or older have been reported to have elevated rates of preterm delivery.[2] Education, occupation, and family income were used to define for socioeconomic status. Many studies have found an increased risk of preterm delivery for women of low socioeconomic status.[2-4] Extremes of pre-pregnancy weight and/or body mass index have been associated with increased rates of preterm delivery.[5] In this study, risks of maternal age, socioeconomic status and pregnancy weight were not statistical significant related to preterm delivery. However, intensive prenatal care has not been shown to decrease the risk of preterm delivery.

Multifetal pregnancy was only 2.4% in this study and was not statistical significant associated with preterm delivery. The mechanism for preterm labor in multiple gestations may be associated to uterine distension, increased intrauterine volume, or associated complications such as cervical insufficiency.[6] Vaginal bleeding after 12 weeks of gestation which resulted from decidual hemorrhage was found only 6 cases (7.2%) in this study. This event could increase risk of preterm labor and preterm premature rupture of membranes.[7]

All infection in this study were only 8 cases (9.6%) and were not statistical significant for preterm delivery. Multiple studies[8,9] have reported an association between infection or inflammation and preterm delivery. This can be described by the evidence of chorioamnionitis in the placentas of 20%-75% of preterm birth and positive membrane cultures in 30%-60% in this group.[8]

Maternal physical activity may increase the incidence of preterm delivery. This can be described by the reduction of uterine blood flow and elevation of stress hormone concentrations (eg, corticotropin-releasing hormone, catecholamines).[10] However, in this study high physical activity and work hard were not related to preterm delivery. Recently, a relationship between maternal activity and preterm birth has not been clearly established.[11]

Cigarette smoking has a relationship with the risk of preterm delivery.[12] This can be described by increased rates of smoking-related complications of pregnancy, including placental abruption, placenta previa, premature rupture of membranes, and

intrauterine growth restriction. In Thai pregnant women, smoking was not high and in this study the number of smoking women were too small to evaluate.

There is evidence that maternal and fetal stress activates cells in the placenta, decidua, and fetal membranes to produce corticotropin-releasing hormone (CRH) which can enhance local prostaglandin production, which initiates contractions.[13] Despite social support during pregnancy has resulted in improvements in psychosocial outcome, it has not been shown to significantly reduce the rate of preterm delivery in stress mother.[14]

From this study, there was only one case which had fibroid and early delivery. Three cases had history of fibroid and had term delivery. Both groups were not statistical significant. The presence of a large fibroid (greater than 5 to 6 cm) appears to be the factor that related to an increased risk of preterm delivery.[15] The mechanism for preterm labor and delivery is due to decrease uterine volume and/or cervical insufficiency.[15]

Anemia (especially hemoglobin less than 9.5 g/dL) is also related to preterm delivery.[16] From this study, the definition of anemia was hemoglobin lesser than 11 g/dL and only 12 cases were found in this study. The mechanisms can be described by increasing synthesis of corticotropin-releasing hormone secondary to hypoxia and increasing norepinephrine secretion due to iron deficiency which resulted in uterine contraction.[17] However, anemia during the third trimester which resulted from normal expansion of maternal plasma volume is not correlated to preterm delivery.[18]

Fetal factor including fetal growth restriction[19] and congenital anomalies[20], both increase the risk of preterm delivery. The mechanism is possibly from iatrogenic delivery which related to abnormal growth and congenital anomalies.

There was no statistical significant in route of delivery, newborn sex and the APGAR score. The incidence of birth asphyxia in preterm group was reduced by the use of glucocorticoid in pregnant women gestational age less than 34 weeks of gestation.

This study has a small number of population which may affect to statistical analysis. However, all different risk factors had no statistical significance which supported the study of Goldenberg RL, et al.[21] Many factors appear to be associated with preterm delivery, but in many centers, the cause is unknown. Most centers around the world try to organize the best care during antenatal period but can not reduce the prevalence of preterm delivery from the unknown causes. From our study, although many factors seem to be unrelated with preterm delivery, this may be from our sample size was too small to evaluate, the intervention must be kept proceeding, instead of keeping rising the prevalence of preterm birth without intervention. A big cohort study should be ongoing for evaluation of the risk factors. Prevention and prediction of preterm labor by identifying of risk factors are also the challenging proposition to reduce preterm birth.

Acknowledgments

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การศึกษาเปรียบเทียบปัจจัยเสี่ยงของการคลอดก่อนกำหนดและครบกำหนด : ระยะเวลา 1 ปี (พ.ศ. 2551) ที่โรงพยาบาลศิริราช

สายฝน ชวาลไพบูลย์, ศิริพงศ์ สวัสดิ์มงคล, ศรุตยา รองเลื่อน, สุพร วรพิทักษานนท์, กนกพร โพธิ์ปฐม

วัตถุประสงค์ : เพื่อประเมินปัจจัยเสี่ยงและผลของการคลอดระหว่างการคลอดก่อนกำหนดและครบกำหนดที่โรงพยาบาลศิริราช ปี พ.ศ. 2551

รูปแบบการศึกษา : การศึกษาแบบสุ่ม

วัสดุและวิธีการ : ระหว่างวันที่ 1 มกราคม พ.ศ. 2551 – 31 ธันวาคม พ.ศ. 2551 สตรีตั้งครรภ์ที่มีปัจจัยเสี่ยงต่อการคลอดก่อนกำหนด อย่างน้อย 1 อย่างถูกนำมาศึกษา ได้ศึกษาถึงปัจจัยเสี่ยงต่อการคลอดก่อนกำหนด สตรีที่มีปัจจัยเสี่ยงจะได้รับการตรวจติดตามจนกระทั่ง คลอด โดยบันทึกอายุครรภ์ที่คลอด น้ำหนักตัวของทารกแรกเกิด และคะแนนแอปการ์ ในการวิเคราะห์ข้อมูลได้ใช้สถิติ descriptive analysis by SPSS 11.5, Continuity Correction, Fisher's exact and Pearson และ Chi-square test

ผลการศึกษา : จากสตรีตั้งครรภ์จำนวน 1,024 ราย ที่มาฝากครรภ์ใหม่ที่โรงพยาบาลศิริราช พบสตรี 331 ราย ที่มีปัจจัยเสี่ยงอย่างน้อย 1 อย่างต่อการคลอดก่อนกำหนด ในกลุ่มนี้ 83 ราย (ร้อยละ 25.1) คลอดในช่วงอายุครรภ์ 24-37 สัปดาห์ และ 240 รายคลอดในช่วง อายุครรภ์หลัง 37 สัปดาห์ สตรีตั้งครรภ์ที่คลอดก่อนกำหนดมีอายุ 25 ± 7.8 (15-42) ปี และมีดัชนีมวลกาย 23.36 ± 3.71 กิโลกรัมต่อ ตารางเมตร (17.0 - 34.2) ส่วนสตรีตั้งครรภ์ที่คลอดครบกำหนดมีอายุ 28.8 ± 7.7 (13-43) ปี และมีดัชนีมวลกาย 24.12 ± 2.78 กิโลกรัม ต่อตารางเมตร (16.5 – 35.1) สตรีตั้งครรภ์ส่วนใหญ่มีการศึกษาต่ำกว่าระดับมัธยมศึกษา และมีความเครียดมากในขณะตั้งครรภ์ โดยทั้ง สองกลุ่มไม่พบความแตกต่างทางสถิติอย่างมีนัยสำคัญ และการศึกษานี้ไม่พบปัจจัยเสี่ยงใดที่มีความสัมพันธ์กับการคลอดก่อนกำหนด

สรุป : ในการศึกษานี้ไม่พบความเสี่ยงใดที่มีความสัมพันธ์กับการคลอดก่อนกำหนด