Thai Journal of Obstetrics and Gynaecology
April 2010, Vol. 18, pp. 54-62

OBSTETRICS

Risk Factors of Birth Asphyxia in Pregnancy 37 Complete Weeks and Over by Apgar Score Less Than 7 at 5 Minutes

Surangtip Thangwijitra MD,
Chamnan Sripramodya MD,
Sukawadee Kanchanawat MD.

Department of Obstetrics and Gynecology, Rajavithi Hospital, Bangkok 10400, Thailand

ABSTRACT

Objectives: To identify risk factors of birth asphyxia determine by Apgar score <7 at 5 minutes in pregnant women delivered at ≥37 weeks of gestation.

Materials and Methods: Medical records of pregnant women with gestational age ≥37 weeks delivered at Rajavithi Hospital between January 1,1999 - June 30,2005 were reviewed. A total number of cases was 130 pregnancies with neonatal Apgar score <7 at 5 minutes and 260 pregnancies with neonatal Apgar score ≥7 at 5 minutes during that period were chosen for controls. Risk factors were analyzed by univariate and multiple regression analysis.

Results: Risk factors that significantly associated with birth asphyxia in pregnancy ≥37 weeks were: small for gestational age(SGA) (OR=12.72;95%CI 5.12 - 31.61,p<0.001), prolonged PROM (OR=8.72;95%CI 1.26 - 60.12,p=0.028), narcotic analgesic used (OR=6.78;95%CI 1.31 - 35.11,p=0.023), no antenatal care (OR=5.87;95%CI 1.56 - 21.82,p=0.008), vaginal breech delivery (OR=5.64;95%CI 1.21 - 26.29,p=0.028), advance maternal age (OR=4.76;95%CI 2.15 - 10.55,p<0.001), large for gestational age (LGA) (OR=3.95;95%CI 1.09 - 14.30,p=0.037), cord compression (OR=3.78;95%CI 1.01 - 14.14,p=0.048), oxytocin usage (OR=3.50;95%CI 1.16-10.62,p=0.027) and meconium-stain amniotic fluid (OR=3.16;95%CI 1.22 - 8.23,p=0.018).

Conclusion: Risk factors significantly associated with birth asphyxia in pregnancy ≥37 weeks were SGA, prolonged PROM, narcotic analgesic used, no antenatal care, vaginal breech delivery, elderly maternal age, LGA, cord compression, oxytocin usage and meconium-stain amniotic fluid.

Keywords: Apgar score, birth asphyxia

Introduction

The Ninth National Health Development Plan (2002–2006) provided the goal of building healthy conditions for all Thai citizens in a holistic manner in partnership with all sectors concerned. One of mother and child health care goal is the rate of birth asphyxia by Apgar score <7 at 1 minute less than 30:1,000 livebirths. Department of Obstetrics and Gynecology, Rajavithi Hospital has responded to the policy by improving the standard of maternal and neonatal care.

From 2000–2004, birth asphyxia uses Apgar score <7 at 1 minute. However it demonstrated poor sensitivity as a marker of birth asphyxia[1]. The more effective diagnosis for birth asphyxia is needed.

The American College of Obstetricians and Gynecologists (1998 and 2004) recommended the birth asphyxia as the following statements: profound metabolic or mixed acidemia (pH<7.0) determined on an umbilical cord arterial blood sample, persistent Apgar score of 0–3 for longer than 5 minutes,evidence of neonatal neurological sequelae such as seizures, coma, or hypotonia; or dysfunction of one or more of the following systems : cardiovascular, gastrointestinal, hematological, pulmonary, or renal.[2] As a result, Apgar score at 5 minutes < 7 is potentially indicated birth asphyxia. This study was aimed to determine the risk factors of birth asphyxia defined as Apgar score at 5 minutes less than 7 among term pregnant women (37 weeks of gestation or more).

Materials and Methods

A case-control study was conducted at Rajavithi Hospital between January 1,1999 – June 30,2005. : Medical records of pregnant women who delivered livebirth at ≥37 weeks of gestation were included in the study. Medical records of those who delivered before hospital arrival or livebirth with major congenital anomalies were excluded. Women who delivered newborns with Apgar score at 5 minutes less than 7 and ≥ 7 were identified as cases and controls, respectively. The proportions of vacuum delivery in a case and control were 18.2% and 7.1%[3], a ratio of case-control to be 1 to 2 and power of 90%, 130 and 260 records for case and control were needed. Thirty-two main factors consisted of demographic and obstetric characteristics as well as pregnancy complications were considered as risk factors of birth asphyxia and neonatal outcomes. This study was approved by the Ethical Committee of Rajavithi hospital.

Statistical analysis

Data were analyzed using SPSS version 11.5 (SPSS, Chicago, IL). Demographic data were reported in numbers, percentages and mean with standard deviation. Discrete risk factors between cases and controls were analyzed by chi-square test or Fisher's Exact test as appropriate (Fisher's Exact test was used instead of Chi-square test if there are >25% of the expected count <5 in each cell). Continuous risk factors were analyzed by unpaired t-test or Wilcoxon Ranksum test as appropriate. Multivariate analysis was then used to determine significant risk factors of birth asphyxia adjusting confounding effect. P-value <0.05 was considered as statistical significance.

Results

During the study period, there were 130 pregnancies with neonatal Apgar score <7 at 5 minutes from of 52,278 livebirths and were matched with 260 pregnancies of newborns with Apgar score ≥7 at 5 minutes as controls. The mean age of cases and controls were significant difference (mean, 28.2±6.8 years VS 25.9±5.3 years,p=0.001). No significant difference in occupation, gravida, parity, history of abortion, gestational age and neonatal sex were detected. The mean birth weights of cases and controls were 2,933±533 g and 3,230±375 g, respectively (p<0.001, Table 1).

The neonatal outcomes with Apgar score <7 were shown in Table 2. Fifteen percent had Apgar score 0-3 (severe depression), 73.6% of them required assisted respirator, 63.2% had abnormal neurological signs and symptoms and 15.8% died in early neonatal period. Eighty-five percent of cases had Apgar score 4–6 (mild to moderate depression). Among these newborns, 60.4% required assisted respirator, 25.2% had neurological signs and symptoms and 3.6% died in early neonatal period.

Table 3 shows the association between maternal age and birth asphyxia. The risk of advance age (≥35 years) was significantly high with OR of 4.76 (95%CI 2.15 - 10.55, p<0.001). Teenage pregnancy (≤19 years) was not significant.

Table 4 shows the association between birth weight and birth asphyxia. Small for gestational age (SGA; <10 percentiles) and large for gestational age (LGA; >90 percentiles) had significant higher risk for

birth asphyxia 12.72 and 3.95 times than appropriate for gestational age (AGA; 10–90 percentiles).

Table 5 shows the association between routes of delivery and birth asphyxia. Vaginal breech delivery has statistically significant risk with OR of 5.64 (95% CI 1.21 – 26.29, p=0.028). Forceps extraction, vacuum extraction and cesarean section were not significance.

Table 6 shows the association between other factors and birth asphyxia by univariate analysis. Multiple regression analysis is shown in Table 7. Prolonged PROM (premature rupture of membrane) >24 hours, narcotic analgesic used, no antenatal care (no ANC), cord compression, oxytocin usage and meconium-stain amniotic fluid were statistical significant risk for birth asphyxia OR=8.72, 6.78, 5.87, 3.78, 3.50 and 3.16 respectively. Hypertensive disorder in pregnancy (blood pressure ≥140/90 mmHg during pregnancy which included chronic hypertension, gestational hypertension, preeclampsia-eclampsia, preeclampsia superimposed on chronic hypertension), anemia (Hb <11 gm/dl in 1st and 3rd trimester or Hb<10.5 gm/dl in 2nd trimester), twin and oligohydramios (Amniotic fluid index ≤5) were not significance. Abnormal fetal heart rate pattern (bradycardia <110 beat/min, tachycardia>160 beat/min, decrease beat to beat variability ≤5 beat/min, increase beat to beat variability >25 beat/min, repetitive late deceleration: FHR gradual, symmetrical decrease from baseline ≥15 beat/min at/or after peak of uterine contraction, repetitive moderate to severe varible deceleration: abrupt decrease FHR then return to base line less than 2 min (moderate deceleration >70 beat/min, severe deceleration <70 beat/min lasting ≥60 sec), prolonged deceleration: FHR deceleration lasting ≥2 min but less than 10 min) OR=0.03 (95%CI 0.01 – 0.07, p<0.001) and diabetes mellites complicating pregnancy (pre-gestational and gestational diabetes) OR=0.03 (95%CI 0.00–0.28, p=0.002) were statistically strong benefit on preventing birth asphyxia.

Table 1. Demographic characteristics

Characteristics	Apgar score at 5 minutes		p-value
	< 7 (N = 130) n (%)	≥ 7 (N = 260) n (%)	
Maternal age (years)			0.001
≤ 19	13 (10.0)	19 (7.3)	
20 – 34	97 (74.5)	231 (88.7)	
≥ 35	20 (15.5)	10 (4.0)	
Gravida			0.611
1	57 (43.8)	108 (41.5)	
≥ 2	73 (56.2)	152 (58.5)	
Parity			0.581
0	70 (53.8)	126 (48.5)	
1	42 (32.3)	91 (35.0)	
≥ 2	18 (13.9)	43 (16.5)	
Abortion			0.351
0	100 (76.9)	211 (81.2)	
≥ 1	30 (23.1)	49 (18.8)	
Gestational age (weeks)			0.829
37 – 41	126 (96.9)	253 (97.3)	
≥ 42	4 (3.1)	7 (2.7)	

Table 1. Demographic characteristics (Cont.)

Characteristics	Apgar score at 5 minutes		p-value
	< 7 (N = 130) n (%)	≥ 7 (N = 260) n (%)	
Occupation			0.779
Housewife	80 (61.5)	150 (57.7)	
Shopkeeper	20 (15.4)	40 (15.4)	
Employee	20 (15.4)	28 (10.8)	
Officer	10 (7.7)	42 (16.1)	
Neonatal sex			0.591
Male	73 (56.2)	138 (53.1)	
Female	57 (43.8)	122 (46.9)	
Birth weight (grams)			< 0.001
2,000 – 2,499	29 (22.0)	6 (2.4)	
2,500 – 3,999	95 (74.0)	250 (96.0)	
≥ 4,000	6 (4.0)	4 (1.6)	

Table 2. Outcomes of neonates with Apgar score <7

Complications	Apgar score at 5 minutes		p–value
	0 – 3 (N = 19) n (%)	4 – 6 (N = 111) n (%)	
Required assisted respirator			
Yes	14 (73.6)	67 (60.4)	0.179
No	5 (26.4)	44 (39.6)	
Abnormal Neurological signs and symptoms			
Yes	12 (63.2)	28 (25.2)	< 0.001
No	7 (36.8)	83 (74.8)	
Neonatal death			
Yes	3 (15.8)	4 (3.6)	0.007
No	16 (84.2)	107 (96.4)	

Table 3. Association of Maternal age and birth asphyxia by multivariate analysis

Maternal age (years)	Apgar score at 5 minutes		Crude OR	Adjusted OR	95%CI	p – value
	<7 (N = 130) n (%)	≥7 (N = 260) n (%)				
≤19 (Teenage)	13(10.0)	19(7.3)	1.41	1.63	0.77–3.43	0.199
20 – 34	97(74.5)	231(88.7)	1	1	1	
≥ 35 (Advance)	20(15.5)	10(4.0)	4.54	4.76	2.15–10.55	< 0.001

Table 4. Association of birth weight and birth asphyxia by multivariate analysis

Birth weight (percentiles)	Apgar score at 5 minutes <7 (N = 130) n (%)	Apgar score at 5 minutes ≥7 (N = 260) n (%)	Crude OR	Adjusted OR	95%CI	p – value
SGA (<10)	29 (22.3)	6 (2.3)	12.15	12.72	5.12–31.61	<0.001
AGA (10-90)	95 (73.1)	250 (96.2)	1	1	1	
LGA (>90)	6 (4.6)	4 (1.5)	3.10	3.95	1.09–14.30	0.037

SGA = Small for gestational age, AGA = Average for gestational age
LGA = Large for gestational age

Table 5. Association of route of delivery and birth asphyxia by multivariate analysis

Route of delivery	Apgar score at 5 minutes <7(N = 130) n (%)	Apgar score at 5 minutes ≥7(N = 260) n (%)	Crude OR	Adjusted OR	95%CI	p–value
Normal delivery	71 (63.12)	200 (76.9)	1	1	1	
Forceps extraction	5 (3.8)	3 (1.2)	3.43	1.47	0.81–12.54	0.077
Vacuum extraction	8 (6.2)	2 (0.8)	8.46	2.87	0.29–28.21	0.365
Vaginal breech delivery	11 (8.5)	5 (1.9)	4.71	5.64	1.21–26.29	0.028
Cesarean section	35 (26.9)	50 (19.2)	1.37	1.02	0.01–5.14	0.082

Table 6. Association of other factors and birth asphyxia by univariate analysis

Factors	Apgar score at 5 minutes <7 (N = 130) n (%)	Apgar score at 5 minutes ≥7 (N = 260) n (%)	Crude OR	95%CI	p – value
Prolonged PROM(premature ruptured of membrane >24 hours)					
Yes	20 (15.4)	2 (0.8)	23.46	5.39 – 102.07	< 0.001
No	110 (84.6)	258 (99.2)	1	1	
Narcotic analgesic use					
Yes	17 (13.1)	6 (2.3)	6.37	2.45–16.54	< 0.001
No	113 (86.9)	254 (97.7)	1	1	
ANC					
Yes	107 (82.3)	250 (96.2)	1	1	< 0.001
No	23 (17.7)	10 (3.8)	5.37	2.47–11.68	

ANC = Antenatal care

Table 6. Association of other factors and birth asphyxia by univariate analysis (Cont.)

Factors	Apgar score at 5 minutes		Crude OR	95%CI	p – value
	<7 (N = 130) n (%)	≥7 (N = 260) n (%)			
Cord compression					
Yes	24 (18.5)	9 (3.5)	6.31	2.84–14.04	< 0.001
No	106 (81.5)	251 (96.5)	1	1	
Oxytocin used					
Yes	39 (30.0)	22 (8.5)	4.64	2.61–8.24	< 0.001
No	91 (70.0)	238 (91.5)	1	1	
Meconium stain amniotic fluid					
Yes	52 (40.0)	20 (7.7)	8.00	4.49–12.22	< 0.001
No	78 (60.0)	240 (92.3)	1	1	
Hypertensive disorder in pregnancy					
Yes	19 (14.6)	6 (2.3)	7.25	2.82–18.64	< 0.001
No	111 (85.4)	254 (97.7)	1	1	
Anemia					
Yes	22 (16.9)	15 (5.8)	3.33	1.66–6.66	0.001
No	108 (83.1)	245 (94.2)	1	1	
Twins					
Yes	7 (5.4)	2 (0.8)	7.34	1.50–35.86	0.004
No	123 (94.6)	258 (99.2)		1	1
Oligohydramios					
Yes	28 (21.5)	2 (0.8)	35.41	8.28 – 151.38	< 0.001
No	102 (78.5)	258 (99.2)	1	1	
Abnormal FHR pattern					
Yes	96 (73.8)	26 (10.0)	25.41	14.47 – 44.63	< 0.001
No	34 (26.2)	234 (90.0)	1	1	
Diabetes complicating pregnancy					
Yes	8 (2.1)	3 (1.2)	5.62	1.47 – 21.55	0.005
No	122 (97.9)	257 (99.2)	1	1	

ANC = Antenatal care

Table 7. Association of other factors and birth asphyxia by multivaiate analysis

Factors	Crude OR	Adjusted OR	95%CI	p–value
Prolonged PROM	23.46	8.72	1.26–60.12	0.028
Narcotic analgesic used	6.37	6.78	1.31–35.11	0.023
No ANC	5.37	5.87	1.56–21.82	0.008
Cord compression	6.31	3.78	1.01–14.4	0.048
Oxytocin usage	4.64	3.50	1.16–10.62	0.027
Meconium stain amniotic fluid	8.00	3.16	1.12–8.23	0.018
Hypertensive disorder in pregnancy	7.25	2.19	0.37–12.89	0.386
Anemia	3.33	1.86	0.54–6.37	0.319
Twins	7.44	7.44	0.99–55.60	0.050
Oligohydramios	4.70	4.70	0.76–29.09	0.095
Abnormal FHR pattern	0.03	0.03	0.01–0.07	<0.001
Diabetes complicating pregnancy	0.03	0.03	0.00–0.28	0.002

PROM = Premature rupture of the membrane

ANC = Antenatal care

Discussion

From January 1st , 1999 – June 30th , 2005, rate of birth asphyxia by Apgar score <7 at 5 minutes in pregnancy with gestational age ≥37 weeks was 2.5:1,000 (130:52,278) which is less than the previous reports. [3-5] This lower rate of the birth asphyxia might be associated with the period of the study because the present study was conducted in the later year which improving the standard of maternal and neonatal care than the previous studies[3-5].

Significant risk factors for birth asphyxia in our study were small for gestational age, prolonged PROM, narcotic analgesic used, no ANC care, vaginal breech delivery, advance maternal age (≥35 years), LGA, cord compression, oxytocin usage and meconium-stain amniotic fluid. Ian M et al's study[3] reported that maternal age was not significant risk factor which different from our study. This might be associated with the difference in the population which women in Ian M et al[3] had multiple medical complications. For this reason, those women were received special care and resulting in delivery of non-asphyxia neonates. Kovavisarach E et al[6] reported oxytocin usage was not significant risk factor that difference from the present study. This might be because Kovavisarach et al[6] included preterm pregnancy and this condition was contraindicated for oxytocin usage. Ibrahim S et al[7] reported 71% of pregnancy with asphyxia newborns had visited in antenatal care which they concluded this reflects the poor perinatal services offered in those maternity homes or hospitals.

Teenage pregnancy (≤19 years), gravida, parity, history of abortion, posterm pregnancy (≥42 weeks), occupation, thyroid disorder, hypertensive disorder in pregnancy, anemia, placenta previa, twin, oligohydramios, cesarean section, forceps extraction and vacuum extraction were not significant risk factors. Boo NY et al[8], Ian M et al[3] and Kaye D et al[9] reported vacuum extraction and forceps extraction were significant risk factors for birth asphyxia. This difference might be associated with the operative vaginal assisted delivery in the present study were preformed following the non-reassuring fetal heart rate pattern indication that were not true fetal acidosis and delivery with non-

complications.

Negative impact on birth asphyxia or strong benefits on preventing birth asphyxia were abnormal fetal heart rate pattern and diabetes mellitus complicating pregnancy. In previous study, abnormal mellitus fetal heart rate pattern was significant risk factor for birth asphyxia[3-8,10,11]. In our study, most of abnormal fetal heart rate pattern was diagnosed as non-reassuring fetal status and immediate cared and dilivered by cesarean section. In the previous study[3] reported diabetes mellitus was not siginificant risk factor for birth asphyxia which was difference from our study. This may be associated with most of diabetes mellitus complicating pregnancy in our study were class A and received special cares and management which result the rate of elective cesarean section was doubling may be reflected the cause of prevention of birth asphyxia.

Apgar score at 5 minutes of gestational age ≥37 weeks was strongly associated with birth asphyxia that demonstrated by the neonatal outcomes, the more severe asphyxia (Apgar score 0–3), the higher incidence of severe neonatal morbidity and mortality including neonatal death, neurological signs and symptoms and required assisted respirator similar to the study of Oswyn et al[4].

This study had recruited large number of risk factors. Variation in number of risk factors is unavoidable. Some categories had no specific risk factors in control group at all. This may reflect either rare events or too small sample sizes. Further study on specific risk factors may give the correction or confirmation to this study.

Conclusion

Risk factors significantly associated with birth asphyxia in pregnancy ≥37 weeks were SGA, prolonged PROM, narcotic analgesic used, no antenatal care, vaginal breech delivery, advance maternal age, LGA, cord compression, oxytocin usage and meconium-stained amniotic fluid. Women having these risk factors should be intensively counseled and closely observed during labor and delivery.

References

1. Marrin M, Paes BA. Birth asphyxia: Does the apgar score have diagnostic value?. Obstet Gynecol 1988; 72: 120 – 3.
2. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC III, Wenstrom KD. Diseases and injuries of the fetus and newborn. In: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC III, Wenstrom KD, editors. Williams obstetrics. 22nded. New York: The McGnaw-Hill companies, 2005: 654-5
3. Ian M,Lars L,Klara T,Aimon N,Anders O,Eva T. Influence of maternal, obstetric and fetal risk factors on prevalence of birth asphyxia at term in Swedish urban population. Acta Obstet Gynecol Scand 2002; 81: 909 - 17.
4. Oswyn G, Vince JD, Fricsen H. Perinatal asphyxia at Port Moresby General Hospital:a study of incidence, risk factors and outcome. P N G Med J 2000; 43:110-20.
5. Matthew E,Nilu M,Dharma S,Anthony M. Risk factors for neonatal encephalopathy in Kathmandu, Nepal. BMJ 2000; 320: 1229 – 36.
6. Kovavisarach E, Juntasom C. Risk factors of delivery of low Apgar score newborn below 7 at 1 minute. J Med Assoc Thai 1999; 82: 660-5.
7. Ibrahim S, Parkash J. Birth asphyxia. J Pak Med Assoc 2002; 52: 553 - 6.
8. Boo NY, Lye MS. Factors associated with clinically significant perinatal asphyxia in Malaysian neonates. J Trop Pediatr 1991; 38: 284 - 9.
9. Kaye D. Antenatal and intrapartum risk factors for birth asphyxia. East Afr Med J 2003; 80: 140 -3.
10. Asakura H,Ichikawa H,Nakabayashi M,Ando K,Kaneko K,Kawabata M,et al. Perinatal risk factors related to neurologic outcomes of term newborns with asphyxia at birth. J Obstet Gynaecol Res 2000; 26: 313-4.
11. Suka M, Sugimori H, Nakamura M,Haginiwa K, Yoshida K. Risk factors of low apgar score in japanese full term deliveries. J Epidemiol 2002; 12: 320 – 3.

ปัจจัยเสี่ยงต่อภาวะการขาดออกซิเจนของทารกแรกเกิดในหญิงตั้งครรภ์อายุครรภ์ตั้งแต่ 37 สัปดาห์ โดยคะแนนแอพการ์ที่ 5 นาที น้อยกว่า 7

สุรางค์ทิพย์ ตั้งวิจิตร, ชำนาญ ศรีประโมทย์, สุขาวดี กาญจนวัฒน์

วัตถุประสงค์: *เพื่อศึกษาปัจจัยเสี่ยงต่อภาวะการขาดออกซิเจนของทารกแรกเกิดในหญิงตั้งครรภ์ อายุครรภ์ตั้งแต่ 37 สัปดาห์เป็นต้นไป โดยคะแนนแอพการ์ที่ 5 นาที น้อยกว่า 7*

รูปแบบการวิจัย: *การวิจัยเชิงวิเคราะห์แบบย้อนหลัง (case-control study)*

วัสดุและวิธีการ: *ศึกษาข้อมูลย้อนหลังจากทะเบียนประวัติหญิงตั้งครรภ์อายุครรภ์ตั้งแต่ 37 สัปดาห์เป็นต้นไป ในโรงพยาบาลราชวิถี ระหว่างวันที่ 1 มกราคม พ.ศ.2542 ถึง วันที่ 30 มิถุนายน พ.ศ.2548 โดยแบ่งเป็น 2 กลุ่ม คือ กลุ่มศึกษา เป็นหญิงตั้งครรภ์ที่คลอดทารกที่มี คะแนนแอพการ์ที่ 5 นาที น้อยกว่า 7 จำนวน 130 ราย และกลุ่มควบคุม เป็นหญิงตั้งครรภ์ที่คลอดทารกที่มีคะแนน แอพการ์ที่ 5 นาที มากกว่าหรือเท่ากับ 7 จำนวน 260 ราย และวิเคราะห์ความสัมพันธ์ของปัจจัยเสี่ยงต่างๆ ต่อภาวะการขาดออกซิเจนของทารกแรกเกิด โดย univariate และ multiple regression analysis*

ผลการศึกษา: *พบว่า ปัจจัยที่มีความสัมพันธ์ต่อภาวะการขาดออกซิเจนของทารกแรกเกิด อย่างมีนัยสำคัญทางสถิติคือ ทารกน้ำหนักน้อยกว่าอายุครรภ์ OR=12.72 (95%CI 5.12-31.61,p<0.001) ภาวะถุงน้ำคร่ำแตกก่อนการเจ็บครรภ์นานเกิน 24 ชั่วโมง OR=8.72 (95%CI 1.26-60.12,p=0.028) การได้รับยาระงับปวดชนิดนาร์โคติก OR=6.78 (95%CI 1.31-35.11,p=0.023) การไม่ฝากครรภ์ OR=5.87 (95%CI 1.56-21.82,p=0.008) การคลอดท่าก้นทางช่องคลอด OR=5.64 (95%CI1.21-26.29,p=0.028) หญิงตั้งครรภ์อายุมาก OR=4.76 (95%CI 2.15-10.55,p<0.001) ทารกน้ำหนักมากกว่าอายุครรภ์ OR=3.95 (95%CI 1.09-14.30,p=0.037) ภาวะสายสะดือถูกกด OR=3.78 (95%CI 1.01-14.14,p=0.048) การได้รับยาออกซิโทซิน OR=3.50 (95%CI 1.16-10.62,p=0.027) และภาวะมีขี้เทาในน้ำคร่ำ OR=3.16 (95%CI 1.22- 8.23,p=0.018)*

สรุป: *ปัจจัยเสี่ยงต่อภาวะการขาดออกซิเจนของทารกแรกเกิดในหญิงตั้งครรภ์ อายุครรภ์ตั้งแต่ 37 สัปดาห์เป็นต้นไป ได้แก่ ทารกน้ำหนักน้อยกว่าอายุครรภ์ ภาวะถุงน้ำคร่ำแตกก่อนการเจ็บครรภ์นานเกิน 24 ชั่วโมง การได้รับยาระงับปวดชนิดนาร์โคติก การไม่ฝากครรภ์ การคลอดท่าก้นทางช่องคลอด หญิงตั้งครรภ์อายุมาก ทารกน้ำหนักมากกว่าอายุครรภ์ ภาวะสายสะดือถูกกด การได้รับยาออกซิโทซิน และภาวะมีขี้เทาในน้ำคร่ำ*

คำสำคัญ: *ภาวะการขาดออกซิเจนของทารกแรกเกิด คะแนนแอพการ์*