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PRETERM DELIVERY: ASSOCIATED RISK FACTORS AND NEONATAL OUTCOMES IN DUHOK HOSPITAL FOR OBSTETRICS AND GYNECOLOGY

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ABSTRACT

Objectives: To identify the risk factors and evaluate the early neonatal outcomes of premature infants in Duhok Hospital for Obstetrics and Gynecology, a tertiary center in Kurdistan Region - Iraq.

Methods: This cross sectional study was carried out from September 1/2021 to December 31/2021. Four hundred participants were recruited, 200 were preterm and 200 were term. The participants were examined and followed till delivery. Multivariable logistic regression analysis was used to identify the risk factors for preterm delivery.

Results: The risks factors for preterm delivery were maternal age ≥ 35 years (AOR 3.32; 95 % CI 1.12-9.86), nulliparity (AOR 2.14; 95 % CI 1.25-3.67), history of preterm birth (AOR 6.51; 95 % CI 1.99-21.28,), no ANC (AOR 3.01; 95 % CI 1.32-6.87), < 4 ANC visits (AOR 1.92; 95 % CI 1.12-3.30), PROM (AOR 4.71; 95 % CI 2.71-8.16), antepartum hemorrhage (AOR 9.25; 95 % CI 1.81-47.39), hypertensive disorders in pregnancy (AOR 2.30; 95 % CI 1.12-4.71) and anemia (AOR 3.51; 95 % CI 1.86-6.63). Preterm delivery is linked to poor early neonatal outcomes.

Conclusions: Early identification of women at risk for preterm delivery by health care providers is essential to prevent preterm delivery.

KEYWORDS: Kurdistan Region - Iraq; Neonatal outcomes; Preterm delivery; Risk factors.

1. INTRODUCTION

The World Health Organization (WHO) defines Preterm birth as delivering a live infant before completing 37 weeks of pregnancy (259 days) counted from the first day of the last menstrual period. Preterm birth can be classified as late preterm from 34 to less than 37 completed weeks of gestation, moderately preterm from 32 to 34 completed weeks, very preterm if the gestational age is less than 32 completed weeks, and extremely preterm if less than 28 completed weeks (Harrison and Goldenberg, 2016). Preterm delivery (PTD) is a significant public health issue because it is the leading cause of newborn and child mortality (Mapp and Gabel, 2019). About one million children die each year due to PTD complications worldwide, with over half of these complications occur in undeveloped nations (Rubens et al., 2014). Even though the survival rates of premature infants have improved in developed countries, numerous undeveloped countries continue to lose preterm infants due to a shortage of adequate neonatal care (Vogel et al., 2018).

Preterm delivery has severe financial and social expenses for the community due to the long-term hospitalization in the intensive care unit and the need for specific therapies. Furthermore, it costs the health care system additional costs after the newborn is discharged from the neonatal care unit (Zainal et al., 2019). Premature birth rates have been rising in most countries over time. Asia and sub-Saharan Africa accounted for (81·1%) of all preterm births worldwide. Low-income counties such as India, China, Nigeria, Bangladesh, and Indonesia had the highest number of preterm births globally (Chawanpaiboon et al., 2019). Preterm delivery has a substantial influence on neonatal health and is related to several long-term consequences, such as respiratory diseases, neurological impairment and intellectual disabilities (Luu et al., 2016),(Ramenghi, 2015). Further, prematurity is strongly linked to visual and hearing impairments (Siswanto et al., 2018),(Zhu et al., 2020). Multifactorial risks are responsible for PTD, including sociodemographic and environmental factors (Salama et al., 2021). The number of antenatal care visits and previous obstetric history has also

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been linked to premature birth (Díaz-Rodríguez et al., 2021). Preterm delivery is more likely among women with prelabour rupture of fetal membranes (Abadiga et al., 2021) and recent pregnancy complications like preeclampsia or antepartum hemorrhage (Regasa et al., 2021).

It is imperative to address PTD in order to improve child health and reduce perinatal mortality. Because similar studies are lacking in our region, this study was conducted to identify PTD risk factors in Duhok city, which would aid in the creation of a practical approach aiming to minimize premature birth.

2. PATIENTS AND METHODS

This cross sectional study was carried out from September 1/2021 to December 31/2021, in Duhok Hospital for Obstetrics and Gynecology, as a tertiary center in Kurdistan Region - Iraq. The recruited participants were 400. They were divided into two groups, 200 were preterm deliveries and 200 term deliveries. The selection method was through systematic random sampling. The inclusion criterion was pregnant women between 24 to less than 37 completed weeks of gestation in the studied group. The control group was ladies who completed 37 weeks of pregnancy and above. Multiple gestations, intrauterine fetal death and fetal anomalies were excluded from the study. After being informed about the purpose of the study, the participants gave an informed verbal consent to participate in it. The study approval was obtained from the Duhok Directorate of Health - Ethical and Research Committee.

Data were collected in the labor room. The participants were directly interviewed using a standardized questionnaire. They were asked about their demographic characteristics and previous medical records, including antenatal care visits, recent and past obstetrical history. The participants underwent a general and obstetrical examination. They were plotted on a partogram to follow their labour progress and the mode of delivery. All neonates were assessed immediately after birth by taking Apgar scores. Neonates who needed admission to the NICU were followed for seven days to determine their early neonatal outcomes.

STATISTICAL ANALYSIS

The data were entered and analyzed by SPSS version 26. Frequency and frequency percent tables were used to describe the data. Categorical data were analyzed by the Chi-square test or Fisher's exact test. Odds ratios and their 95% confidence intervals were also calculated for categorical variables. Numerical data were analyzed by unpaired t-test for differences in means. A *p*-value less than 0.05 was considered statistically significant. All the variables supposed to be risk factors for preterm delivery and exhibited *p*-values less than 0.05 in the bivariable regression analysis were entered into a multivariable binary logistic regression model to find the independent risk factors for preterm delivery. Statistically significant findings were written in bold font.

3. RESULTS

3.1 Sociodemographic Characteristics

The study recruited 400 participants; 200 were preterm cases (studied group), and 200 were controls (control group). Maternal age at delivery ranged between 18 and 48 years in the studied group, with a mean and standard deviation (SD) of 28.13 and ± 6.28, respectively. In the control group, maternal age varied from 18 to 43 years, with a mean of 27.20 years and a standard deviation of ± 5.60 years. There was no statistically significant difference in the mean age of the studied and control group (p-value 0.136). Table 1 shows, that the majority of the study participants were between the ages of 20 and 34, with (68%) in the studied versus (79.5%) in the control group. More than half of the studied (51.5%) and controls (54.5%) lived in urban areas. Illiterate mothers were more in the studied group (29.5%) than the control one (26 %). In both groups, the rate of mothers with primary education was nearly identical, with (26.5%) of the studied versus (26%) of controls. Secondary school was acquired by about one-third of the mothers in both groups. College graduates were (14%) of the studied and (16.5%) of the controls. Monthly income was enough for more than half of the participants in both groups. The vast majority of our participants were housewives, with (86.5%) in the studied group versus (92%) in the control one.

3.2 Obstetrics- and Medical- related Characteristics

According to Table 2 and 3, half of the participants were multipara (P1-P4) in the studied group compared to (61%) of controls. Grandmultipara (≥P5) were (13%) of the studied compared to (7 %) of controls. Nullipara (P0) were more common in the studied group (37%)

than in the control group (32%). There were (12%) with no antenatal care (ANC) in the studied group compared to (6.5%) in control one. Poor ANC (< 4 visits) was more prevalent in the studied group than in the control group, with (33%) and (21.5%), respectively. Participants with prior history of previous preterm deliveries were (10.5%) in the studied group compared to only (2%) in control one. In the studied group, 78 (39%) of participants attended with a history of prelabour rupture of fetal membranes (PROM) at home, compared to (13.5%) in the control one. Participants with a history of vaginal bleeding made up (7.5%) of those studied, compared to (1%) of the controls. In both groups, vaginal delivery was more common than the cesarean section, with (36.5%) in the studied group versus (27%) in the control one. Forty-four (22%) of those studied and 19 (9.5%) of controls had hypertensive disorders in pregnancy (HDP). Anemia was present in (26%) of those studied, compared to (9.5%) of the controls

3.3 Risk Factors for Preterm Delivery

In bivariable logistic regression analysis (Tables 1,2,3), the risk factors for preterm delivery regarded statistically significant were maternal age ≥ 35 years, Grandmultiparity (≥ P5), previous history of preterm birth, no ANC visits, < 4 ANC visits, PROM, antepartum hemorrhage, hypertensive disorders in pregnancy, anemia and mode of delivery. The multivariable analysis (Table 4) showed that maternal age ≥ 35 years (AOR 3.32; 95 % CI 1.12-9.86, p = 0.030), P0 (AOR 2.14; 95 % CI 1.25-3.67, p = 0.006), history of prior preterm birth (AOR 6.51; 95 % CI 1.99-21.28, p = 0.002), no antenatal care visits (AOR 3.01; 95 % CI 1.32-6.87, p = 0.009), < 4 antenatal care visits (AOR 1.92; 95 % CI 1.12-3.30, p = 0.018), PROM (AOR 4.71; 95 % CI 2.71-8.16, p < 0.001), antepartum hemorrhage (AOR 9.25; 95 % CI 1.81-47.39, p = 0.008), hypertensive disorders in pregnancy (AOR 2.30; 95 % CI 1.12-4.71, p = 0.023) and anemia (AOR 3.51; 95 % CI 1.86-6.63, p < 0.001) were all significantly associated with preterm delivery.

3.4 Early neonatal outcomes

The mean gestational age (GA) for the studied group was 33.27 ± 3.08. In terms of neonatal intensive care unit (NICU) admissions, (37%) of preterm infants were admitted to the NICU. Table 5 and 6 reveal that low 5-minute Apgar scores were more common in the extremely and very preterm groups, with (73.3%) and (26.8%), respectively. In terms of respiratory distress syndrome (RDS), (31.5%) of preterm infants were diagnosed with RDS. Obviously, the rate of RDS decreased with increasing gestational age. Furthermore, (94.5%) of preterm infants had low birth weight compared to only (4%) of term babies. Preterm infants were more likely than term babies to have low Apgar scores, the difference was statistically significant (p < 0.001). Premature infants had a higher rate of early neonatal death (ENND) than their counterparts, with (9.5 %) and (0.5%), respectively.

3. DISCUSSION

Prematurity is associated with extremes of maternal age (Jiang et al., 2018). The current study revealed that participants 35 years old and above had 3.3 folds increased risk for PTD. This is in agreement with a study carried out in Iran, which showed a strong association between maternal age (≥ 35 years) and giving birth prematurely (Ghelichkhani et al., 2021). This is also in line with a study in Canada, which concluded other pregnancy complications such as hypertension, diabetes and placenta previa are more common as maternal age increases (Fuchs et al., 2018). Regarding maternal characteristics, including level of education and socioeconomic status were not significantly associated with PTD. This finding is in the same line with the study of Campbell *et al.*, who found no substantial relationship between socioeconomic parameters and premature birth (Campbell et al., 2018). In contrast, a study carried out in Nigeria showed that maternal economic class and education were significantly related to PTD (Omole-Ohonsi and Attah, 2012). Taha *et al.* reported low educated mothers below secondary school had a 4-fold increased chance of giving birth prematurely (Taha et al., 2020). This could be because more educated women and those from higher socioeconomic backgrounds are thought to find it easier to seek prenatal care. Nulliparous were more likely to have a premature birth than multiparous women. This finding is in agreement with a study conducted in Egypt, which reported the strong association between nulliparity and PTD might be explained by the presence of additional variables like preeclampsia and accidental bleeding (El Beltagy et al., 2016). Mayo *et al*. found an increased risk for spontaneous preterm labor among nulliparous teenagers (Mayo et al., 2017).

Pregnant women with no antenatal care visits or fewer than four visits had a higher chance of giving birth prematurely in this study. This finding is confirmed by a case- control study conducted by Gurung et al. (Gurung et al., 2020). Regasa *et al*. found that women with fewer than three visits had a higher chance of a premature birth than those who had three or more visits (Regasa et al., 2021). This may be due to the fact that women who get frequent antenatal care follow-up may have a better chance of detecting and treating obstetric issues. History of a previous premature birth was one of the main risk factors for PTD. This finding is confirmed by previous studies (Sureshbabu et al., 2021) (Tingleff et al., 2022). Prelabour (premature) rupture of membranes (PROM) is a crucial risk factor for PTD and is responsible for about 30 percent of all preterm deliveries (Weissmann-Brenner et al., 2009). In this study, women who experienced PROM had a 4.7-fold higher risk for PTD. This finding is supported by a study conducted at Mukalla Hospital in Yemen, which revealed that women who attended with PROM were four times more likely to have PTD than those without PROM (Dahman, 2020). This is also in congruence with the study of Abadiga *et al*. (Abadiga et al., 2021). Antepartum hemorrhage (7.5%) was significantly associated with PTD. This result is in agreement with the study of Akintayo *et al*., who reported that (9.9%) of women in the preterm group had APH and found a strong relationship between APH and premature birth (Akintayo et al., 2015). This is also in the same line with the study of Patil & Patil (Patil and Patil, 2017). Concerning the mode of delivery, in the multivariable regression analysis, there was no significant relationship between cesarean section as a mode of childbirth and PTD. This is in agreement with a study carried out in Yemen (Dahman, 2020). However, this finding contradicts the study of Taha *et al*., who reported that more than half of the women in the preterm group delivered by cesarean section (Taha et al., 2020).

Women with HDP had a 2.3-fold higher chance for PTD. This finding is supported by a study conducted in China (Jiang et al., 2018). A case-control study in California revealed that all types of hypertension raise the risk of PTD, with preeclampsia having the highest risk (Rohlfing et al., 2020). Anemic women were 3.5 times more likely to give birth to a preterm infant. This finding is consistent with the study of Abadiga *et al*., who found that anemia was related to a 4-fold rise in PTD (Abadiga et al., 2021). This result is also similar with a prospective cohort study in India (Parks et al., 2019). The present study revealed that the chance of NICU admission decreased with advancing gestational age. This finding agrees with previous studies (Svenvik et al., 2015), (Adu-Bonsaffoh et al., 2019). The study showed 37% admissions to the NICU among preterm newborns, whereas, Adu-Bonsaffoh *et al*. had 20% (Adu-Bonsaffoh et al., 2019). This can be explained by the high number of extremely and very preterm infants with low Apgar scores in the present study. The high rate of ENND was among the extreme and very preterm neonates. The total rate of ENND was (9.5%) which was higher in comparison to Akintayo *et al*. study (5.4%) (Akintayo et al., 2015) and Cnattingius *et al*. study (1.4%) (Cnattingius et al., 2020). There was a strong association between RDS and low gestational age. The risk of RDS was higher, especially before 34 weeks of pregnancy. This is consistent with the study of Correeia *et al*. (Correia et al., 2016). The incidence of RDS was higher among infants with low Apgar scores. This is in line with a study conducted in Sweden by Altman *et al*., who reported that the rate of RDS among neonates with Apgar scores < 7 at 5 minutes was more (24.4 %) compared to those with high apgar scores (12.4 %) (Altman et al., 2013). The result of the current study corresponds with previous studies which reported that preterm deliveries were strongly related to poor neonatal outcomes. like low Apgar scores, low birth weight, NICU admission, early neonatal death and RDS, as compared to term births (Adu-Bonsaffoh et al., 2019) , (Cnattingius et al., 2020).

5. CONCLUSIONS

Early recognition of women at risk for preterm delivery by health care providers will help them to rapidly and effectively handle and treat any obstetric issues. Accurate and urgent management of preterm birth by highly specialized obstetricians and pediatricians is essential for improving neonatal outcomes. Furthermore, providing high-quality facilities in the neonatal intensive care unit could lower neonatal death and enhance the survival of premature neonates.

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CONFLICT OF INTEREST

The authors declare no conflict of interest regarding this study.

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Table (1):- Comparison of sociodemographic characteristics between the studied group and control group

Sociodemographic characteristics		Studied group		Controls		Total		Odds ratio (95% CI)	*P*-value
		No.	%	No.	%	No.	%		
Age (years)	< 20	16	8.0	19	9.5	35	8.7	Ref. group	0.965
	20 - 34	136	68.0	159	79.5	295	73.8	1.02 (0.50-2.05)	**0.025**
	≥ 35	48	24.0	22	11.0	70	17.5	**2.59 (1.12-5.97)**	
Area of residence	Urban	103	51.5	109	54.5	212	53.0	Ref. group	0.548
	Rural	97	48.5	91	45.5	188	47.0	1.13 (0.76-1.67)	
Level of education	Illiterate	59	29.5	52	26.0	111	27.7	1.34 (0.72-2.50)	0.363
	Primary school	53	26.5	52	26.0	105	26.2	1.20 (0.64-2.26)	0.570
	Secondary school	60	30.0	63	31.5	123	30.8	1.12 (0.61-2.08)	0.713
	College and above	28	14.0	33	16.5	61	15.3	Ref. group	
Socioeconomic state (income)	Not enough	43	21.5	31	15.5	74	18.5	1.73 (0.94-3.16)	0.077
	Enough	112	56.0	113	56.5	225	56.2	1.23 (0.77-1.98)	0.383
	Enough and more	45	22.5	56	28.0	101	25.3	Ref. group	
Occupation	Housewife	173	86.5	184	92.0	357	89.2	1.32 (0.41-4.23)	0.644
	Employee	22	11.0	9	4.5	31	7.8	3.42 (0.86-13.67)	0.082
	Student	5	2.5	7	3.5	12	3.0	Ref. group	
Total		200	100.0	200	100.0	400	100.0		

Ref. group: Reference group or the category with the lowest risk, is a baseline group with which other groups are compared.

Table(2):- Comparison of past obstetric history-related characteristics between the studied group and control group

Obstetric characteristics		Studied group		Controls		Total		Odds ratio (95% CI)	*P*-value
		No.	%	No.	%	No.	%		
Parity	P0	74	37.0	64	32.0	138	34.5	1.41 (0.92-2.16)	0.114
	P1 - P4	100	50.0	122	61.0	222	55.5	Ref. group	
	≥ P5	26	13.0	14	7.0	40	10.0	**2.27 (1.12-4.57)**	**0.022**
Birth interval	No previous birth	74	37.0	64	32.0	138	34.5	1.42 (0.91-2.23)	0.122
	≤ 2 years	46	23.0	39	19.5	85	21.3	1.39 (0.83-2.34)	0.207
	> 2 years	80	40.0	97	48.5	177	44.3	Ref. group	
History of preterm birth	Yes	21	10.5	4	2.0	25	6.3	**5.75 (1.94-17.07)**	**< 0.001**
	No	179	89.5	196	98.0	375	93.7	Ref. group	
History of stillbirth	Yes	9	4.5	2	1.0	11	2.8	4.66 (1.00-21.87)	0.051
	No	191	95.5	198	99.0	389	97.2	Ref. group	
History of abortion	Yes	53	26.5	47	23.5	100	25.0	1.17 (0.75-1.85)	0.489
	No	147	73.5	153	76.5	300	75.0	Ref. group	
Total		200	100.0	200	100.0	400	100.0		

Table(3):- Comparison of characteristics related to current pregnancy between the studied group and control group

		Studied group		Controls		Total		Odds ratio (95% CI)	*P*-value
		No.	%	No.	%	No.	%		
ANC visits	No ANC	24	12.0	13	6.5	37	9.3	**2.42 (1.18-4.96)**	**0.016**
	< 4 times	66	33.0	43	21.5	109	27.2	**2.01 (1.27-3.17)**	**0.003**
	≥ 4 times	110	55.0	144	72.0	254	63.5	Ref. group	
PROM	Yes	78	39.0	27	13.5	105	26.3	**4.10 (2.50-6.72)**	**< 0.001**
	No	122	61.0	173	86.5	295	73.8	Ref. group	
Antepartum hemorrhage	Yes	15	7.5	2	1.0	17	4.3	**8.03 (1.81-35.58)**	**0.001**
	No	185	92.5	198	99.0	383	95.8	Ref. group	
Hypertensive disorders in pregnancy	Yes	44	22.0	19	9.5	63	15.8	**2.69 (1.51-4.80)**	**0.001**
	No	156	78.0	181	90.5	337	84.3	Ref. group	
Diabetes mellitus	Yes	7	3.5	2	1.0	9	2.3	3.59 (0.74-17.50)	0.175
	No	193	96.5	198	99.0	391	97.8	Ref. group	
Anemia	Yes	52	26.0	19	9.5	71	17.8	**3.35 (1.90-5.91)**	**< 0.001**
	No	148	74.0	181	90.5	329	82.3	Ref. group	
Mode of delivery	Vaginal	127	63.5	146	73.0	273	68.3	Ref. group	**0.041**
	Cesarean	73	36.5	54	27.0	127	31.8	**1.55 (1.02-2.38)**	
Fetal gender	Male	95	47.5	103	51.5	198	49.5	Ref. group	0.424
	Female	105	52.5	97	48.5	202	50.5	1.17 (0.80-1.74)	
Total		200	100.0	200	100.0	400	100.0		

ANC: Antenatal care; PROM: Prelabour rupture of the membranes

Table (4):- Multivariable logistic regression analysis of risk factors for preterm delivery of the studied group and control group

Factor	B	S.E.	*P*-value	Adjusted OR (95% CI)
Age < 20 (Ref. group)				
Age 20 - 34	0.347	0.441	0.431	1.41 (0.60-3.36)
Age ≥ 35	1.201	0.555	**0.030**	**3.32 (1.12-9.86)**
P1 – P4 (Ref. group)				
P0 (nullipara)	0.761	0.275	**0.006**	**2.14 (1.25-3.67)**
≥ P5	0.481	0.427	0.261	1.62 (0.70-3.74)
History of preterm birth	1.873	0.605	**0.002**	**6.51 (1.99-21.28)**
ANC visits ≥ 4 (Ref. group)				
No ANC visit	1.102	0.421	**0.009**	**3.01 (1.32-6.87)**
ANC visit < 4	0.652	0.276	**0.018**	**1.92 (1.12-3.30)**
PROM	1.545	0.281	**<0.001**	**4.71 (2.71-8.16)**
Antepartum hemorrhage	2.225	0.834	**0.008**	**9.25 (1.81-47.39)**
Hypertensive disorders in pregnancy	0.833	0.365	**0.023**	**2.30 (1.12-4.71)**
Anemia	1.255	0.325	**<0.001**	**3.51 (1.86-6.63)**
Mode of delivery (cesarean)	0.207	0.270	0.444	1.23 (0.72-2.09)

B: Regression coefficient; S.E.: Standard error of B; OR: Odds ratio; CI: Confidence interval.

Table(5):- Neonatal outcomes of the studied group

	Extremely preterm (<28 weeks)		Very preterm (28 - 32 weeks)		Moderately preterm (32 - 34 weeks)		Late preterm (34 - 36 weeks)		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Birth weight < 2.5 kg	15	100.0	41	100.0	29	93.5	104	92.0	189	94.5
Birth weight ≥ 2.5 kg	0	0.0	0	0.0	2	6.5	9	8.0	11	5.5
Apgar at 1 min < 7	12	80.0	22	53.7	7	22.6	7	6.2	48	24.0
Apgar at 1 min ≥ 7	3	20.0	19	46.3	24	77.4	106	93.8	152	76.0
Apgar at 5 min < 7	11	73.3	11	26.8	2	6.5	3	2.7	27	13.5
Apgar at 5 min ≥ 7	4	26.7	30	73.2	29	93.5	110	97.3	173	86.5
RDS	15	100.0	30	73.2	10	32.3	8	7.1	63	31.5
No RDS	0	0.0	11	26.8	21	67.7	105	92.9	137	68.5
ENND	9	60.0	6	14.6	1	3.2	3	2.7	19	9.5
No ENND	6	40.0	35	85.4	30	96.8	110	97.3	181	90.5
Total	15	100.0	41	100.0	31	100.0	113	100.0	200	100.0

RDS: Respiratory distress Syndrome; ENND: Early neonatal death

Table(6):- Neonatal outcomes of the studied group, compared to that of the control group

Indicator	Studied group		Controls		Total		Odds ratio (95% CI)	*P*-value
	No.	%	No.	%	No.	%		
Birth weight < 2.5 kg	189	94.5	8	4.0	197	49.3	**412.36 (162.28-1047.85)**	**< 0.001**
Birth weight ≥ 2.5 kg	11	5.5	192	96.0	203	50.7	Ref. group	
Apgar at 1 min < 7	48	24.0	13	6.5	61	15.2	**4.54 (2.37- 8.69)**	**< 0.001**
Apgar at 1 min ≥ 7	152	76.0	187	93.5	339	84.8	Ref. group	
Apgar at 5 min < 7	27	13.5	5	2.5	32	8.0	**6.09 (2.29- 16.15)**	**< 0.001**
Apgar at 5 min ≥ 7	173	86.5	195	97.5	368	92.0	Ref. group	
RDS	63	31.5	2	1.0	65	16.2	**45.53 (10.96-189.19)**	**< 0.001**
No RDS	137	68.5	198	99.0	335	83.8	Ref. group	
ENND	19	9.5	1	0.5	20	5.0	**20.89 (2.77-157.62)**	**< 0.001**
No ENND	181	90.5	199	99.5	380	95.0	Ref. group	
Total	200	100.0	200	100.0	400	100.0		