ORIGINAL ARTICLE

Short-Term Neonatal Morbidities Associated with Early Term Births

Rachaporn Rattanamalee, MD[1], Pracha Nuntnarumit, MD[2]

[1] Specific Medical System Section, Medical Services Division, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand; [2] Division of Neonatology, Department of Pediatrics, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

Objective: To determine short-term morbidities of infants born at early term gestation.

Materials and Methods: A medical chart review was conducted to compare the data between early term at 37 to 38^{+6} weeks of gestation and full term neonates at 39 to 40^{+6} weeks of gestation born between January 1, 2018 and December 31, 2021 at Ramathibodi Hospital, Mahidol University, Thailand. The primary and secondary outcomes were short-term respiratory and non-respiratory morbidities of early term neonates, respectively.

Results: One thousand eight hundred neonates were recruited, 900 were early term and 900 were full term neonates. Overall, early term neonates were 44.3% spontaneous births and 23.5% elective cesarean sections. Early term neonates had significantly increased risk of respiratory morbidities, including delayed transitional period (p<0.001), transient desaturation (p=0.038), transient tachypnea of the newborns (p<0.001), and requirement of oxygen supplementation (p<0.001). Early term neonates also had significantly higher non-respiratory morbidities than those of full term neonates, including hypothermia (p<0.001), hypoglycemia (p=0.003), jaundice requiring phototherapy (p=0.004), septic evaluations (p<0.001), admission to a special care nursery (p<0.001), total length of stays (p<0.001), and readmission (p=0.018).

Conclusion: Early term neonates had significantly increased risk of short-term respiratory and non-respiratory morbidities. Avoidance of early term delivery should be performed to prevent morbidities related to early term births.

Keywords: Early term neonates; Early term births; Neonatal morbidities

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Term neonates are defined as infants born at 37 to 41^{+6} weeks of gestation, they are categorized as early term neonates at 37 to 38^{+6} weeks of gestation, full term neonates at 39 to 40^{+6} weeks of gestation, and late term neonates at 41 to 41^{+6} weeks of gestation. Early term neonates account for 15% to 34% of all live births[1-3]. More than 50% of these early term neonates are born by spontaneous delivery, while, the others are born due to maternal or fetal medically indicated conditions, or by elective induction of delivery[2-5]. Previous studies found that early term neonates had a higher risk of short-term morbidities compared with full term neonates, including respiratory morbidities and requirement of oxygen supplementation and respiratory supports[3-12]. Early term neonates also had non-respiratory morbidities higher than that of full term neonates, including hypothermia, hypoglycemia, and feeding problems. They also have more intravenous fluid and antibiotic administration, jaundice requiring phototherapy, length of hospital stays, rate of special care nursery (SCN) admissions and readmission[5-14]. Furthermore, early term births increased the risk of long-term morbidities, such as wheezing, lower respiratory tract infection, cerebral palsy, behavior, and learning problems[3,5,6,15]. The American College of Obstetrics and Gynecologists and the Society for Maternal-Fetal Medicine have recommended non-medically indicated delivery, including cesarean delivery, induction of labor and cervical ripening, not being performed before 39 weeks of gestation to decrease neonatal risks associated with early term births[16].

Since most studies on early term births were conducted in developed countries, the present study aimed to determine the short-term respiratory and non-respiratory morbidities of early term neonates compared to those born as full term neonates in

Correspondence to:

Nuntnarumit P.

Department of Pediatrics, Faculty of Medicine Ramathibodi Hospital, Mahidol University, 270 Rama VI Road, Ratchathewi, Bangkok 10400, Thailand.

Phone & **Fax**: +66-2-2011816

Email: pracha.nun@mahidol.ac.th

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a tertiary private, university hospital in Bangkok, Thailand.

Materials and methods

Study design

The present study was an ambispective chart reviews for comparison of the data between early term and full term neonates born between January 1, 2018 and December 31, 2021 at Somdech Phra Debaratana Medical Center, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand. The present study was approved by Ramathibodi Hospital Ethic Committee (COA. MURA2021/562) in July 2021. Therefore, data collection before the ethic approval date was retrospectively reviewed, and the authors conducted prospective reviews of the data after the ethic approval date. The early term and full term neonates were defined as neonates born at 37 to 38^{+6} and 39 to 40^{+6} weeks of gestation, respectively. The gestational age was determined by last menstrual period and/or earliest antenatal ultrasound within the first trimester of pregnancy. The authors excluded neonates born earlier than 37 or later than 41 weeks of gestation and those who had major congenital anomalies.

Maternal and neonatal baseline characteristics were collected from medical records. Types of delivery were divided into three categories, 1) spontaneous delivery, which was defined as the presence of labor pain and/or rupture of membrane before delivery, 2) medically indicated delivery, which was defined as the delivery with any maternal or fetal medical conditions, such as previous cesarean delivery or myomectomy or uterine rupture, placenta previa or accreta, maternal diabetes mellitus with poor control or vascular complications, maternal hypertension, oligohydramnios or polyhydramnios, multiple gestations, fetal restriction or abnormal fetal surveillance, and 3) non-medically indicated delivery, or elective delivery, which was defined as the absence of labor pain or rupture of membrane and no medically indicated conditions before delivery.

The primary outcomes were short-term respiratory morbidities, which were categorized into seven respiratory conditions, including 1) delayed transitional period, defined as the presence of respiratory distress that occurred within the first hour after birth and resolved within six hours after birth, 2) transient desaturation, defined as the presence of oxygen saturation of less than 95% without respiratory distress and requiring only oxygen supplementation, 3) transient tachypnea of the newborn (TTNB), defined as the presence of respiratory distress that occurred within six hours after birth and persisted for more than six hours with a chest radiograph compatible with retained lung fluid, 4) respiratory distress syndrome (RDS), defined as the presence of respiratory distress that occurred within six hours after birth and a chest radiograph that revealed hypoaeration, diffuse ground-glass appearance, air bronchograms or white-out lung, 5) meconium aspiration syndrome, defined as the presence of respiratory distress that occurred within six hours after birth with a history of meconium-stained amniotic fluid and compatible chest radiograph findings including hyperaeration, patchy infiltration or air trapping, 6) air leak syndrome, including pneumothorax, pneumomediastinum, and pneumopericardium, and 7) persistent pulmonary hypertension of the newborn (PPHN), defined as the persistent desaturation with findings of high pulmonary pressure measured by an echocardiogram. The requirement of oxygen supplementation and respiratory supports, with non-invasive and invasive supports, were also collected.

The secondary outcomes were non-respiratory morbidities, including 1) hypothermia, defined as the rectal temperature less than 36.5°C as the time of nursery admission, 2) hypoglycemia, defined as blood glucose of less than 40 mg/dL, 3) jaundice that occurred within 72 hours after birth and requiring phototherapy or exchange transfusion, 4) presumed sepsis, defined as the neonates requiring septic evaluations with complete blood count, C-reactive protein and/or hemoculture, and intravenous antibiotics, 5) the rate of SCN admission, 6) prolonged hospitalization five days or more after birth, 7) total length of stays, and 8) readmission within 28 days after birth.

Sample size

According to the primary outcome and based on the previous studies[4,6,7], the authors estimated that respiratory morbidities of early term and full term neonates were 5% and 2.5%, respectively. With an alpha value of 0.05 and a power of 0.8, 1,800 neonates were required. A simple random sampling by a computer-generating method was used to randomly select neonates from the birth cohort during the study period into two groups, early term and full term group, with a 1:1 ratio, 900 neonates in each group.

Statistical analysis

Data analysis was performed by using IBM

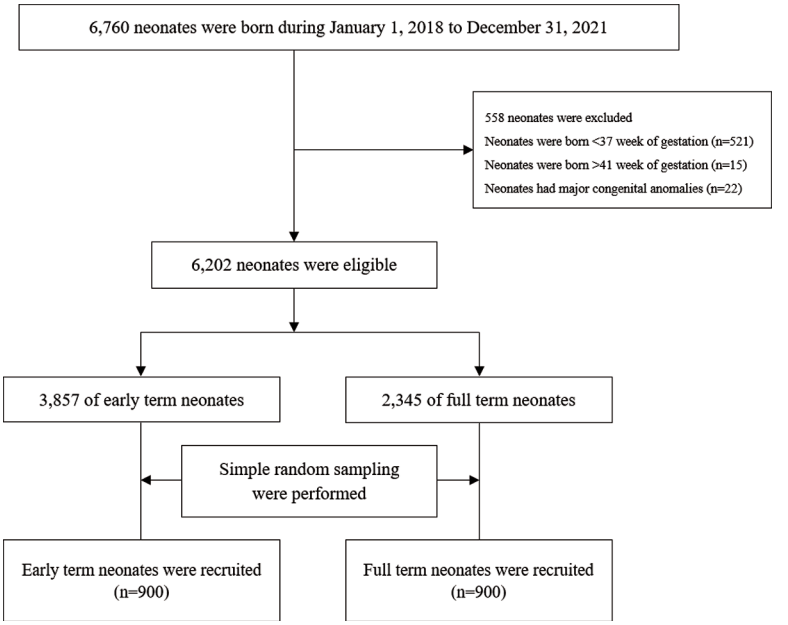

Figure 1. Study flow.

SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Data were shown as a number (percentage), mean (± standard deviation) or median (interquartile range). Categorical data were compared between groups by using chi-square test or Fisher's exact test. The Student's t-test or Mann-Whitney U test was used to compare continuous data. Logistic regression was used for multivariate analysis to calculate adjusted odds ratios (OR) and 95% confidence intervals (CI) using the significant factors from baseline characteristics, which included maternal age, maternal multiparity, maternal hypertension and placental conditions, mode and type of delivery, and small for gestational age (SGA), defined as birth weight of less than 10 percentiles. Statistical significance was determined as a p-value less than 0.05.

Results

Six thousand seven hundred sixty neonates were born between January 1, 2018 and December 31, 2021, but 558 neonates were excluded. There were 3,857 (57.1%) and 2,345 (34.7%) early term and full term neonates, respectively. After a simple random sampling, 900 early term and 900 full term neonates were recruited into the present study as shown in Figure 1.

Maternal and neonatal baseline characteristics are shown in Table 1. Mothers of early term neonates were significantly higher in age, parity, cesarean delivery, and medically indicated delivery. The types of delivery of early term and full term neonates were spontaneous delivery in 44.3% and 54.8%, medically indicated delivery in 32.2% and 23.8% and non-medically indicated delivery, or elective cesarean delivery in 23.5% and 21.4%, respectively. The most common indication for medically indicated delivery was previous cesarean delivery, which was found in 192 of 290 (66.2%) and 88 of 214 (41.1%) of early term and full term neonates, respectively. The present study found no significant differences between the two groups regarding neonatal baseline characteristics, except for SGA neonates, in which early term group had a significantly higher proportion than that of full term group (p=0.029).

The primary outcomes are shown in Table 2. Early term neonates had significantly increased risk of respiratory morbidities compared with full term neonates, including delayed transitional period (p<0.001), transient desaturation (p=0.038), and TTNB (p<0.001). They also required oxygen supplementation more than that of full term neonates, including oxygen free flow (p<0.001), and oxygen box (p<0.001).

The secondary outcomes are shown in Table 3. Early term neonates had significantly more non-respiratory morbidities than that of full term neonates, including hypothermia on nursery admission (p<0.001), hypoglycemia (p=0.003),

Table 1. Maternal and neonatal baseline characteristics

Baseline characteristics	Early term (n=900)	Full term (n=900)	p-value
Maternal baseline characteristics			
Maternal age (years); mean±SD	34.4±3.8	33.6±3.7	<0.001
Multi parity; n (%)	412 (45.8)	321 (35.7)	<0.001
Cesarean delivery; n (%)	742 (82.4)	631 (70.1)	<0.001
Types of delivery; n (%)			
• Spontaneous delivery	399 (44.3)	493 (54.8)	<0.001
• Medically indicated delivery	290 (32.2)	214 (23.8)	<0.001
• Non-medically indicated delivery	211 (23.5)	193 (21.4)	0.087
Diabetes mellitus; n (%)	133 (14.8)	112 (12.4)	0.149
Hypertension; n (%)	16 (1.8)	6 (0.7)	0.039
Placenta conditions*; n (%)	8 (0.9)	1 (0.1)	0.045
Neonatal baseline characteristics			
Male; n (%)	457 (50.8)	459 (51.0)	0.925
Apgar score at 5 minutes; median (IQR)	8 (8 to 9)	9 (9 to 10)	0.782
Birth weight (grams); mean±SD	3,037±383	3,194±355	0.148
Small for gestation age; n (%)	160 (17.8)	126 (14.0)	0.029

SD=standard deviation; IQR=interquartile range

* Placenta conditions including placenta previa and placenta accreta

Table 2. Primary outcomes

Respiratory morbidities	Early term (n=900) n (%)	Full term (n=900) n (%)	p-value	Odds ratio (95% CI)	Adjusted odds ratio* (95% CI)
Respiratory complications	471 (52.3)	125 (13.8)	<0.001	8.1 (5.9 to 9.8)	9.6 (6.7 to 13.5)
Delayed transitional period	259 (28.8)	36 (4.0)	<0.001	9.7 (6.7 to 13.9)	11.1 (9.2 to 14.7)
Transient desaturation	71 (7.9)	49 (5.4)	0.038	1.5 (1.1 to 2.2)	1.4 (1.2 to 4.9)
TTNB	136 (15.1)	35 (3.9)	<0.001	4.4 (3.0 to 6.5)	4.2 (2.9 to 6.3)
Air leak syndrome	4 (0.4)	3 (0.3)	0.705	1.3 (0.3 to 5.9)	1.4 (0.5 to 7.1)
PPHN	0 (0.0)	1 (0.1)	0.317	NA	NA
RDS	1 (0.1)	0 (0.0)	0.317	NA	NA
MAS	0 (0.0)	1 (0.1)	0.317	NA	NA
Oxygen supplementation	274 (30.4)	109 (12.1)	<0.001	3.3 (1.1 to 8.3)	3.5 (1.5 to 8.3)
Oxygen free flow	183 (20.3)	77 (8.6)	<0.001	2.7 (2.1 to 3.6)	2.9 (2.2 to 3.9)
Oxygen box	77 (8.6)	17 (1.9)	<0.001	4.9 (2.9 to 8.3)	6.1 (3.5 to 10.1)
Oxygen cannula	14 (1.5)	15 (1.6)	0.852	0.9 (0.4 to 1.9)	0.9 (0.4 to 2.2)
Respiratory supports	19 (2.1)	13 (1.5)	0.417	1.1 (0.5 to 4.2)	1.1 (0.6 to 4.7)
Non-invasive respiratory supports					
• HHHFNC	7 (0.8)	6 (0.7)	0.781	1.2 (0.4 to 3.5)	1.1 (0.3 to 3.6)
• CPAP	10 (1.1)	6 (0.7)	0.315	1.7 (0.6 to 4.6)	1.6 (0.5 to 5.1)
Invasive respiratory support	2 (0.2)	1 (0.1)	0.563	2.0 (0.2 to 3.0)	1.4 (0.2 to 6.1)

TTNB=transient tachypnea of the newborns; RDS=respiratory distress syndrome; PPHN=persistent pulmonary hypertension of the newborn; MAS=meconium aspiration syndrome; HHHFNC=heated humidified high flow nasal cannula; CPAP=continuous positive airway pressure; CI=confidence interval; NA=not available

* Adjust odds ratio for maternal age, maternal multiparity, maternal hypertension and placental conditions, mode and type of delivery and small for gestational age

jaundice requiring phototherapy (p=0.004), and septic evaluations (p<0.001). The rate of SCN admission in early term neonates was significantly higher than that of full term neonates (p<0.001). Respiratory problems, 92 of 142 (64.8%) were the most common causes of SCN admission of early term neonates. Additionally, the early term neonates had an increased risk of prolonged length of stays (p<0.001) and hospital readmission (p=0.018), which were attributed to breastfeeding problems in 24 of 39 (61.5%), and suboptimal intake hyperbilirubinemia in 25 of 28 (89.3%).

Table 3. Secondary outcomes

Non-respiratory morbidities	Early term (n=900)	Full term (n=900)	p-value	Odds ratio (95% CI)	Adjusted odds ratio* (95% CI)
Hypothermia; n (%)	37 (4.1)	14 (1.6)	<0.001	2.7 (1.5 to 5.1)	2.4 (1.3 to 4.6)
Hypoglycemia; n (%)	30 (3.3)	11 (1.2)	0.003	2.8 (1.4 to 5.6)	2.2 (1.1 to 4.9)
Jaundice requiring phototherapy; n (%)	44 (4.9)	21 (2.3)	0.004	2.2 (1.3 to 3.6)	2.1 (1.1 to 4.2)
Infectious complications; n (%)					
Septic evaluations	109 (12.1)	46 (5.1)	<0.001	2.6 (1.8 to 3.7)	2.9 (1.9 to 3.8)
Need intravenous antibiotics	8 (0.9)	20 (2.2)	0.077	0.4 (0.2 to 1.0)	0.1 (0.1 to 0.3)
Rate of SCN admission; n (%)	142 (15.8)	71 (7.9)	<0.001	2.2 (1.8 to 2.9)	2.1 (1.6 to 3.0)
Length of stay ≥5 days; n (%)	39 (4.3)	26 (2.9)	0.129	1.5 (0.9 to 2.5)	1.2 (0.7 to 2.2)
Rate of readmission; n (%)	28 (3.1)	13 (1.4)	0.018	2.2 (1.1 to 4.3)	2.1 (1.1 to 4.2)
Total length of stay (days); mean±SD	3.3±1.1	3.1±1.2	<0.001	NA	NA

SCN=special care nursery; SD=standard deviation; CI=confidence interval; NA=not available

* Adjust odds ratio for maternal age, maternal multiparity, maternal hypertension and placental conditions, mode and type of delivery and small for gestational age

Table 4. Subgroup analysis of primary outcomes according to the type of deliveries

Respiratory morbidities	Non-medically indicated delivery			Medically indicated delivery			Spontaneous delivery		
	Early term (n=211) n (%)	Full term (n=193) n (%)	p-value	Early term (n=290) n (%)	Full term (n=214) n (%)	p-value	Early term (n=399) n (%)	Full term (n=493) n (%)	p-value
Respiratory complications	153 (72.5)	31 (16.0)	<0.001	163 (56.2)	36 (16.8)	<0.001	155 (38.9)	58 (11.8)	<0.001
Delayed transitional period	95 (45.0)	10 (5.2)	<0.001	73 (25.2)	8 (3.7)	<0.001	91 (22.8)	18 (3.7)	<0.001
Transient desaturation	18 (8.5)	12 (6.2)	0.313	34 (11.7)	17 (7.9)	0.052	19 (4.8)	20 (4.0)	0.491
TTNB	38 (18.0)	7 (3.6)	<0.001	55 (19.0)	9 (4.2)	<0.001	43 (10.8)	19 (3.9)	<0.001
Air leak syndrome	1 (0.5)	1 (0.5)	0.815	1 (0.3)	1 (0.5)	0.705	2 (0.5)	1 (0.2)	0.895
PPHN	0 (0.0)	0 (0.0)	NA	0 (0.0)	1 (0.5)	0.956	0 (0.0)	0 (0.0)	NA
RDS	1 (0.5)	0 (0.0)	0.539	0 (0.0)	0 (0.0)	NA	0 (0.0)	0 (0.0)	NA
MAS	0 (0.0)	1 (0.5)	0.539	0 (0.0)	0 (0.0)	NA	0 (0.0)	0 (0.0)	NA
Oxygen supplementation	85 (40.3)	25 (13.0)	<0.001	105 (36.2)	30 (14.0)	<0.001	84 (21.1)	54 (10.9)	0.036
Oxygen free flow	60 (28.4)	19 (9.8)	<0.001	64 (22.0)	23 (10.8)	0.005	59 (14.8)	35 (7.1)	<0.001
Oxygen box	21 (10.0)	3 (1.6)	<0.001	33 (11.4)	5 (2.3)	<0.001	23 (5.8)	9 (1.8)	0.007
Oxygen cannula	4 (1.9)	3 (1.6)	0.780	8 (2.8)	2 (0.9)	0.240	2 (0.5)	10 (2.0)	0.366
Respiratory supports	7 (3.3)	4 (2.0)	0.617	9 (3.1)	3 (1.4)	0.521	3 (0.8)	6 (1.2)	0.725
Non-invasive respiratory supports									
• HHHFNC	1 (0.5)	2 (1.0)	0.578	5 (1.7)	2 (0.9)	0.394	1 (0.3)	2 (0.4)	0.894
• CPAP	4 (1.9)	1 (0.5)	0.131	4 (1.4)	1 (0.5)	0.601	2 (0.5)	4 (0.8)	0.601
Invasive respiratory support	2 (0.9)	1 (0.5)	0.559	0 (0.0)	0 (0.0)	NA	0 (0.0)	0 (0.0)	NA

TTNB=transient tachypnea of the newborns; RDS=respiratory distress syndrome; PPHN=persistent pulmonary hypertension of the newborn; MAS=meconium aspiration syndrome; HHHFNC=heated humidified high flow nasal cannula; CPAP=continuous positive airway pressure; NA=not available

Subgroup analysis of short-term morbidities according to the type of deliveries are shown in Table 4 and 5. The authors found that early term neonates had significantly higher respiratory morbidities than full term neonates, independent of the type of delivery. Respiratory complications in early term and full term neonates were 72.5% and 16% in non-medically indicated, 56.2% and 16.8% in medically indicated, and 38.9% and 11.8% in spontaneous deliveries, respectively. Early term and full term neonates required oxygen supplementation at 40.3% and 13% in non-medically indicated, 36.2% and 14% in medically indicated, and 21.1% and 10.9% in spontaneous deliveries, respectively. In addition, early term neonates also had an increased risk of non-respiratory morbidities than that of full term neonates.

Discussion

Early term neonates account for 15% to 34% of all live birth infants in developed countries, with a spontaneous birth rate of 40% to 50% and non-

Table 5. Subgroup analysis of secondary outcomes according to the type of deliveries

Non-respiratory morbidities	Non-medically indicated delivery			Medically indicated delivery			Spontaneous delivery		
	Early term (n=211)	Full term (n=193)	p-value	Early term (n=290)	Full term (n=214)	p-value	Early term (n=399)	Full term (n=493)	p-value
Hypothermia; n (%)	10 (4.7)	2 (1.0)	0.031	17 (5.9)	3 (1.4)	0.046	10 (2.5)	9 (1.8)	0.464
Hypoglycemia; n (%)	8 (3.8)	2 (1.0)	0.041	8 (2.8)	1 (0.5)	0.240	14 (3.5)	8 (1.6)	0.026
Jaundice requiring phototherapy; n (%)	10 (4.7)	4 (2.1)	0.026	14 (4.8)	2 (0.9)	0.006	20 (5.0)	15 (3.0)	0.107
Infectious complication; n (%)									
Septic evaluation	26 (12.3)	10 (5.2)	0.006	50 (17.2)	9 (4.2)	<0.001	33 (8.3)	27 (5.5)	0.012
Need intravenous antibiotics	1 (0.5)	2 (1.0)	0.810	2 (0.7)	1 (0.5)	0.581	5 (1.3)	17 (3.4)	0.500
Rate of SCN admission; n (%)	35 (16.6)	17 (8.8)	0.036	55 (19.0)	9 (4.2)	<0.001	52 (13.0)	45 (9.1)	0.006
Length of stay ≥5 days; n (%)	14 (6.6)	7 (3.6)	0.038	12 (4.1)	4 (1.9)	0.362	13 (3.3)	15 (3.0)	0.812
Rate of readmission; n (%)	7 (3.3)	2 (1.0)	0.126	3 (1.0)	2 (0.9)	0.854	18 (4.5)	9 (1.8)	0.042
Total length of stay (days); mean±SD	3.4±1.1	3.3±1.0	0.230	3.5±1.2	3.1±0.9	0.016	3.0±1.0	2.9±1.2	0.145

SCN=special care nursery; NA=not available

medically indicated delivery of 5% to 15%[1-3]. In Thailand, there is limited data regarding the outcomes of early term births. The present study showed that early term births accounted for 57.1% of all live births and they had a high rate of non-medically indicated delivery, or elective cesarean delivery, of 23.5%. The authors found that mothers of early term neonates had higher pregnancy related complications than those of full term neonates. The American College of Obstetrics and Gynecologists and the Society for Maternal-Fetal Medicine recommend not to defer the delivery if there were obstetric complications or indications for pregnancy delivery[16], therefore, these may support the present study having such a higher rate of early term births. A high rate of elective cesarean section in early term births might be explained by the fact that the present study was conducted at a private center, and obstetricians may desire to perform planned cesarean delivery to avoid emergency cesarean delivery.

Respiratory morbidities of early term births were significantly higher than that of full term births, including delayed transitional period, transient desaturation, TTNB, and requirement of oxygen free flow and box, even after adjusting for confounding factors, including maternal age, maternal multiparity, maternal hypertension, placental conditions, mode and type of delivery, and SGA status, supporting that the gestation age was a strong independent factor contributing to respiratory morbidities. These findings were also supported by the previous studies[17-22].

Non-respiratory morbidities of early term neonates in the present study were also significantly higher than that of full term neonates. These findings were supported by the previous studies that showed a high rate of short-term adverse outcomes associated with early term births, including hypoglycemia, hypocalcemia, breastfeeding problems, requirement of intravenous fluids, septic evaluation, treatment with intravenous antibiotic, and SCN admission[4,6-10,12]. The present study also found that early term neonates have longer hospital stays than full term neonates and breastfeeding problems were the most common reason. This is in contrary to the previous studies that showed early term neonates had prolonged hospitalization due to jaundice and respiratory problems[12,23]. Feeding problems of early term neonates might be explained by an immature oromotor function and decrease awakening[2,10,24,25]. In addition, the rate of cesarean delivery of early term births in the present study was high and this may result in delayed lactogenesis, leading to breastfeeding problems.

The present study found that early term neonates had a higher rate of hospital readmission compared with full term neonates, a suboptimal intake hyperbilirubinemia was the most common cause. This may be explained by the immature function of sucking and latching, physiologic immature function of hepatic bilirubin uptake and conjugation of these neonates, and delayed lactogenesis due to a high rate of cesarean delivery. Previous studies also reported that the main reasons for readmission of early term neonates were jaundice, feeding problems, and respiratory distress[13,14,23].

Results of subgroup analysis according to the types of delivery indicated that early term neonates had a higher risk of short-term morbidities than that of full term neonates. Since early term birth

was an independent risk factor for these short-term morbidities regardless of the delivery's categories, therefore, delivery in early term gestation should be avoided.

There are limitations to the present study. Because the authors conducted an ambispective study, a retrospective and prospective medical chart reviews, some data may be missing, particularly in a retrospective review, however the authors were able to collect all data that were important and relevant for analysis. Sample selection in the present study was performed using a simple random sampling of early term and full term neonates, this may result in an imbalance of baseline characteristics between the two groups. However, simple random sampling in a large sample size like in the present study would reduce selection bias and imbalance of potential confounding factors. The differences in baseline characteristics between the two groups might indicate that these characteristics themselves related to gestational age at delivery, for early term versus full term births. The authors also used multivariate analysis to adjust for the possible confounding factors that affect the outcomes. In addition, study population in the present study was from a single, tertiary care, private center, and the long-term follow up of early term neonates was not performed.

Conclusion

Early term neonates have increased risk of short-term respiratory and non-respiratory morbidities. Avoidance of early term delivery should be encouraged to prevent morbidities associated with early term births. In setting of the high demand for cesarean delivery during the early term period, the discussion with parents and medical teams about morbidities of early term births should be addressed.

What is already known on this topic?

The risk of both short-term respiratory and non-respiratory morbidities is higher in early term neonates.

What does this study add?

Approximately one half of all term live births, between 37 and 40 weeks gestational age, in the present study were early term neonates, and one fourth were delivered by elective cesarean section. Thus, by refraining from early term delivery, the morbidities associated with early term births could be avoided.

Conflicts of interest

The authors declare no conflict of interest.

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