



ORIGINAL ARTICLE

Prevalence and Morbidity of Late Preterm Infants: Current Status in a Medical Center of Northern Taiwan

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Key Words
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Background: "Late preterm" defines infants born at 34^{0/7} through 36^{6/7} weeks' gestation, which comprise a majority of preterm births. These infants were treated clinically as "near-term" in the past, but recent studies have implied increased morbidities that differentiate late preterm and term infants. The purpose of this study was to examine the prevalence and clinical complications that could be associated with late preterm birth, as compared to term.

Methods: This was a retrospective cohort study that reviewed infants born in a medical center in Northern Taiwan during a 2-year period between 2008 and 2009. Maternal obstetrical factors, neonatal demographic distributions, and neonatal complications were compared between full-term and late preterm deliveries.

Results: During the study period, there were 7998 live births in the institute, including 6507 term and 1491 preterm infants. Of the latter, there were 914 (61.3 %) born after 34 weeks' gestation. The Neonatal Intensive Care Unit (NICU) (including a special care nursery) admission rate was higher in late preterm infants when compared to term (36% vs. 2%), and was 74%, 43%, and 21% in infants born at 34, 35, and 36 weeks' gestation, respectively. Compared with term infants, late-preterm infants had longer hospital stay if admitted to NICU (including special care nursery) (17 days vs. 10 days), and they were associated with increased risk of neonatal morbidities, including respiratory distress syndrome (2.6% vs. 0.02%), respiratory distress of other etiologies (16% vs. 2%), culture-proven sepsis (0.7% vs. 0.2%), hypoglycemia (3% vs. 0.4%), temperature instability (0.4% vs. 0.05%), feeding difficulty (2% vs. 0.4%), and hyperbilirubinemia needing phototherapy (14% vs. 3%). Late-preterm infants also had higher hospital readmission rate (4.4 % vs. 2.3%, $p < 0.001$) and neonatal mortality rate (0.3% vs. 0.08%, $p = 0.03$).

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Conclusion: Late-preterm infants have increased risk of neonatal morbidities associated with organ immaturity. The results of this study emphasize the importance of judicious obstetrical decision-making when considering late preterm delivery, and the need to set up anticipatory clinical guidelines for the care of late preterm infants.

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1. Introduction

Preterm birth, defined as birth that occurs on or before the end of the 37th week (259th day) of pregnancy, counting from the first day of the last menstrual period, is a conventional medical terminology endorsed by the American Academy of Pediatrics (AAP), the American College of Obstetricians and Gynecologists (ACOG), and the World Health Organization.^{1,2} Although preterm infants is a category known for its high mortality and various morbidities, the overall incidence of prematurity-related complications decreases significantly if the infant was born after 34 weeks' gestational age. In obstetric and pediatric practice, those infants born with less degree of prematurity are often considered functionally as full-term, and often are cared for in the well-baby nursery after birth. It was not until the last decade that special health concerns of these "near-term" infants arose.^{3,4} Mounting reports identified increased morbidities that differentiate late preterm and term infants. Furthermore, there was an awakening concern about using the term "near-term," which connotes that the infant is almost term and almost fully mature, might lead health care professionals to underestimate the inherent risks to these infants.

General consensus came with the 2005 workshop, "Optimizing Care and Outcome of the Near-Term Pregnancy and the Near-Term Newborn Infant," sponsored by the National Institutes of Health, which recommended that infants born at 34^{0/7} through 36^{6/7} weeks' gestation after the onset of the mother's last menstrual period be referred to as late preterm to emphasize that these infants are preterm and, as such, are at risk of immaturity-related medical complications.⁵ In past decades, rising trend of preterm births was caused by an increase in the birth rate of late preterm infants.⁶ In those infants born late preterm, increased morbidities related to physiologic immaturity of the respiratory, metabolic, neurologic, and immunologic systems have been observed.⁷ It was also noted that they had a higher rate of hospital readmission during the neonatal period.⁸

It is important to discern the epidemiology and the actual neonatal morbidities of late preterm delivery, so that evidence can be provided to guide obstetrical decision-making and to direct anticipatory care for infants at risk. To our knowledge, there has been no previous study reported from Taiwan. The aim of our study was to examine the prevalence and clinical complications that could be associated with late preterm birth, as compared to term.

2. Methods

This was a retrospective cohort study of all late preterm live births (34^{0/7} to 36^{6/7} weeks of gestation) during the

2-year period between January 2008 and December 2009 in Chang Gung Medical Center, Lin Kou, Taiwan. Patients were identified, and the relevant clinical information was collected from electronic medical records. Full-term infants (37^{0/7} to 40^{6/7} weeks of gestation) born in the same institute during the same period were chosen and served as control group. In those infants who were admitted to special care units other than well baby nursery, their maternal obstetrical factors and neonatal demographic distributions were collected. Maternal obstetrical factors included hypertensive disorder of pregnancy (chronic hypertension, pregnancy-induced hypertension, and preeclampsia), diabetes (gestational and established), mode of delivery (cesarean section or vaginal delivery), indication for delivery (onset of labor, rupture of amniotic membrane, antepartum hemorrhage, abruption placentae, or fetal distress), indication for cesarean section (previous cesarean section, placenta previa, breech presentation, or unclear), multiple pregnancies (twins or triplets), and pregnancy outcome of major neonatal congenital anomalies such as pulmonary hypoplasia, congenital heart disease, structural malformation, and chromosomal anomalies.

Demographic features of the newborn included gestational age (calculated from onset of the mother's last menstrual period), sex, birth weight (in grams obtained after delivery within 1 hour after birth), and Apgar scores at 1 and 5 minutes after birth.

Outcome measures of neonatal complications included neonatal morbidities, admission to the neonatal intensive care unit (NICU; including special care nursery), duration of hospital stay if admitted to NICU or special care nursery, rate of hospital readmission within the neonatal period, and neonatal death. Criteria of NICU or special care nursery admission could be any of the following: birth body weight less than 2200 g, gestational age less than 34 weeks, respiratory or circulatory instability, hypoglycemia, significant hyperbilirubinemia, suspected sepsis, or the need for close monitoring as assessed by a neonatologist.

Neonatal morbidities included respiratory complications [respiratory distress syndrome (RDS), transient tachypnea of newborn (TTN), persistent pulmonary hypertension (PPHN), pneumonia and air leak syndrome], apnea events (cessation of breathing for longer than 20 seconds, or any duration if accompanied by cyanosis and bradycardia), culture-proven sepsis (early-onset or late-onset, divided as infections occurring before and after 1 week of life), neurologic complications (convulsion, periventricular leukomalacia, intraventricular or intracranial hemorrhage), hypoglycemia (blood glucose level of less than 40 mg/dL in capillary or venous blood sample, and criteria for checking serum glucose: small for gestational age, infants of diabetes mothers, giant babies with birth weight more than 4000 g, or clinical symptoms associated with

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