

Breastfeeding Difficulties and Exclusivity Among Late Preterm and Term Infants: Results From the All Our Babies Study

Tharsiya Nagulesapillai, MSc,¹ Sheila W. McDonald, PhD,² Tanis R. Fenton, PhD,^{1,3}
Hannah Faye G. Mercader, BHSc,² Suzanne C. Tough, PhD^{1,2}

ABSTRACT

OBJECTIVE: To compare breastfeeding difficulties attributable to the baby and mother/milk and exclusive breastfeeding between a group of late preterm (LP) infants and term infants.

METHODS: We utilized data from a prospective community-based cohort (n=2977) in Calgary, Alberta, and performed bivariate and multivariable analyses to identify demographic, obstetric, maternal and infant health indicators that were independently associated with term status and breastfeeding outcomes.

RESULTS: Multivariable analyses found that LP status was an independent risk factor for breastfeeding difficulties attributable to the baby (OR 1.72, 95% CI 1.24-2.38), but not for difficulties due to mother/milk (defined as not producing enough milk or having flat or inverted nipples). Among women who were breastfeeding at hospital discharge, mothers of LP infants were less likely to report exclusive breastfeeding at 4 months (OR 0.67, 95% CI 0.46-0.97), after controlling for household income level, mode of delivery and postpartum maternal physical health.

CONCLUSIONS: Mothers of LP infants need increased support to establish successful breastfeeding outcomes and to ensure that these infants receive the full benefits of breast milk.

KEY WORDS: Breastfeeding; infant, preterm; epidemiology

La traduction du résumé se trouve à la fin de l'article.

Can J Public Health 2013;104(4):e351-e356.

Preterm birth is defined as delivery of a live born infant before 37 weeks of completed gestation.¹ Worldwide, about 15 million babies (more than 10% of all births) are born preterm.¹ There are three commonly used or established categories of preterm birth based on gestational age: very early (<32 weeks), early (32^{0/7}-33^{6/7} weeks), and late preterm (LP; 34^{0/7}-36^{6/7} weeks). "Late preterm" was introduced to replace the "near term" descriptor to differentiate this group as more similar to preterm infants and more vulnerable compared to term infants.² The increase in preterm birth rates in recent years can be largely attributed to increases in LP births.³ The Canadian preterm birth rate was approximately 8.1% in 2006 to 2007 and almost three quarters (74.0%) of these births were late preterm.⁴ Indeed, LPs are the largest and fastest growing subgroup of preterm births, a trend that constitutes a growing public health concern given its increased risk of morbidity compared to longer gestations.⁵ Despite assumptions that LP infants are similar to term infants, LPs are physiologically and metabolically immature.⁵ LP infants are more likely to be diagnosed with temperature instability, hypoglycemia, respiratory distress, apnea, jaundice, and feeding difficulties during birth and in the first month of life.⁵ Although less is known about long-term outcomes for LPs and their families, recent reports suggest that there are subtle developmental delays that present as poor school outcomes,⁶ cognitive impairments, and behavioural and emotional problems.⁷ In addition, mothers of LPs tend to report both short-term and long lasting distress, including breastfeeding difficulties, anxiety and depression, and post-

traumatic stress.^{5,8-12} Given the large population attributable risk associated with the LP gestation category, such findings may have major implications for health and education services.

Although the benefits associated with breastfeeding for infants and mothers are well documented,¹³ the rates of exclusive breastfeeding at 4 to 6 months are far from optimal in many countries,¹⁴ including Canada,¹⁵ which fail to meet WHO's recommendation of exclusive breastfeeding for the first six months of life.¹⁶ In Canada, the rate of breastfeeding initiation is promising at 90.3%, however only 14.4% of mothers surveyed reported exclusively breastfeeding at 6 months.¹⁵

Preterm birth is a risk factor for early discontinuation of breastfeeding, along with other known factors such as maternal age,

Author Affiliations

1. Department of Community Health Sciences, Alberta Children's Hospital Research Institute, Faculty of Medicine, University of Calgary, Calgary, AB
2. Department of Pediatrics, Faculty of Medicine, University of Calgary, Calgary, AB
3. Department of Nutrition Services, Alberta Health Services, Calgary, AB

Correspondence: Dr. Suzanne Tough, Child Development Centre, c/o 2888 Shaganappi Trail NW Calgary, AB T3B 6A8, Tel: 403-955-2272, Fax: 403-955-5979, E-mail: suzanne.tough@albertahealthservices.ca

Acknowledgements: We are grateful to all the families who took part in this study. Our thanks to the investigators, co-ordinators, research assistants, graduate and undergraduate students, volunteers, clerical staff and managers of the All Our Babies Study team. Alberta Innovates Health Solutions provided funding for this cohort; additional funding from the Alberta Centre for Child, Family, and Community Research assisted with the analysis of data presented in this paper. The University of Calgary provided trainee salary support. Preterm Birth and Healthy Outcomes (PreHOT) Alberta Innovates Health Solutions Interdisciplinary Team Grant #200700595.

Conflict of Interest: None to declare.

Table 1. Comparison of Demographic and Maternal Characteristics Between LP and Full-term Groups

Characteristic	Total Sample (n=3472) Mean (SD) n (%)	Terms (n=2778) Mean (SD) n (%)*	Late-preterms (n=173) Mean (SD) n (%)*	P-value
Maternal age	31.1 (4.4)	31.2 (4.4)	31.1 (4.5)	0.76
Education				
High school or less	361 (11.0)	268 (9.7)	17 (10.0)	0.62
College, trade, university	2404 (73.3)	2063 (74.8)	122 (71.8)	
Graduate school	513 (15.7)	428 (15.5)	31 (18.2)	
Household income				
<\$80,000	985 (31.0)	747 (27.9)	59 (35.8)	0.03
≥\$80,000	2191 (69.0)	1930 (72.1)	106 (64.2)	
Marital status				
Married/common-law	3093 (94.4)	2634 (95.5)	162 (95.9)	0.81
Other	182 (5.6)	125 (4.5)	7 (4.1)	
Ethnicity				
White/Caucasian	2576 (78.7)	2221 (80.5)	119 (70.4)	0.001
Other	699 (21.3)	537 (19.5)	50 (29.6)	
Born in Canada				
Canadian-born	2568 (78.3)	2201 (79.7)	123 (72.8)	0.03
Foreign-born	713 (21.7)	562 (20.3)	46 (27.2)	
Parity				
Nulliparous	1588 (48.7)	1331 (48.4)	85 (51.2)	0.48
Multiparous	1674 (51.3)	1418 (51.6)	81 (48.8)	
Mode of delivery				
Vaginal	2256 (75.8)	2116 (76.3)	123 (71.1)	0.12
Cesarean	719 (24.2)	659 (23.7)	50 (28.9)	

* Denominator varies due to missing values for some variables.

Table 2. Comparison of Breastfeeding Outcomes, and Infant and Maternal Health Indicators Between LP and Full-term Groups

Characteristic	Terms (n=2778) n (%)/ Median (IQR)*	Late-preterms (n=173) n (%)/ Median (IQR)*	P-value
Infant health indicators			
Baby stayed in NICU	69 (2.5)	33 (19.1)	<0.001
Baby stayed overnight in hospital	133 (4.8)	23 (13.3)	<0.001
Maternal health indicators			
Poor emotional health at 4 months postpartum	203 (7.3)	25 (14.4)	0.001
Poor physical health at 4 months postpartum	320 (11.5)	27 (15.6)	0.11
Inadequate social support	360 (13.1)	30 (17.7)	0.09
Breastfeeding outcomes			
Exclusively breastfed at 4 months among women able to breastfeed upon hospital discharge from birth	1506 (64.2)	63 (54.76)	0.03
Had breastfeeding difficulties attributable to baby	1255 (45.2)	103 (59.5)	<0.001
Had breastfeeding difficulties attributable to mother/milk	845 (30.4)	66 (38.2)	0.03
Montreal Children's Hospital Feeding Scale	23 (10)	24 (11.5)	0.17

* Denominator varies due to missing values for some variables.

income, education, smoking, physical and mental health problems.¹⁷⁻²⁰ The mechanisms underlying the associations between shortened gestation and breastfeeding difficulties, including early cessation, have been the focus of recent investigations.²¹⁻²⁴ There may be several reasons as to why preterm delivery is associated with early cessation of breastfeeding, including the length of NICU stay,^{25,26} as longer hospitalization results in longer mother–infant separation. In fact, infants who are cared for longer in hospitals are more likely to be formula fed at the time of hospital discharge.²⁵ In addition, late preterm infants have less effective (immature) sucking during breastfeeding, which can limit the removal of available milk.²² The immature sucking of preterm babies and the delayed lactogenesis are cyclic, as immature sucking can further reduce milk production, which can limit the milk available to the infant, and could interfere with successful breastfeeding.²² Among mothers of late preterm infants who are at risk of delayed lactogenesis, evidence suggests that if breasts are stimulated and available milk is regularly removed, lactation can be preserved by 7 to 10 days post-birth.²²

A synthesis of published research pertaining to the establishment of breastfeeding outcomes among LP infants found that the duration of breastfeeding can be difficult to determine because studies

vary in measurements, type of breastfeeding examined, and classifications of preterms.²³ Breastfeeding rates for LP infants may even be less than those for early preterm infants at several weeks postpartum,²⁷ possibly because mothers with high-risk infants in NICU often receive extra breastfeeding support. Further research is needed using prospective investigations to better understand lactation issues for the LP population in order to develop innovative strategies to establish and maintain breastfeeding success. The current study evaluated the independent influence of LP birth status on breastfeeding difficulties attributable to the baby and to the mother/milk and on breastfeeding exclusivity at 4 months postpartum among those able to breastfeed upon leaving hospital after birth, while controlling for demographic, obstetric, maternal and infant health indicators.

METHODS

The All Our Babies (AOB) study is a community-based prospective pregnancy cohort in Alberta, Canada that began in 2008. The objectives of the AOB study were to examine maternal well-being, health service utilization, risk and protective factors for adverse birth events and trajectories of child development. Participants completed questionnaires at three time points: twice during the

Table 3. Adjusted Logistic Regression Models Examining the Independent Contribution of LP Birth Status to Breastfeeding Difficulties Attributable to Baby and Mother/Milk and Exclusive Breastfeeding at 4 Months Postpartum Among Women Who Were Breastfeeding at Hospital Discharge

Independent Variable	BF Difficulties Attributable to Baby*	BF Difficulties Attributable to Mom/Milk*	EBF at 4 Months†
	OR (95% CI)	OR (95% CI)	OR (95% CI)
LP birth status	1.72 (1.24-2.38)§	1.34 (0.96-1.87)	0.67 (0.46-0.97)‡
Foreign-born	1.34 (1.11-1.61)	–	–
Income <\$80,000	–	–	0.71 (0.59-0.85)
Multiparous	0.45 (0.39-0.52)	0.48 (0.40-0.56)	–
Caesarean delivery	1.27 (1.07-1.51)	1.56 (1.30-1.87)	0.68 (0.56-0.82)
Poor physical health at 4 months postpartum	1.40 (1.10-1.76)	1.42 (1.10-1.81)	0.53 (0.41-0.69)
Inadequate social support	–	1.59 (1.26-2.00)	–

Only those variables that remained significant at $p < 0.05$ in the final model for each respective outcome are shown.

* Reference group: No BF difficulties.

† Reference group: Not EBF.

‡ Significance value for OR is $p = 0.03$.

§ Significance value for OR is $p = 0.001$.

prenatal period (at <25 weeks and at 34-36 weeks) and once during the postpartum period (at 4 months). Participants provided consent for medical record linkage. Information on recruitment, data collection and questionnaires utilized in the AOB study is described in detail elsewhere.²⁸ For the purposes of this study, we restricted the sample to women giving birth to a singleton infant ($n = 2977$). The All Our Babies study was approved by the Child Health Research Office and the Conjoint Health Research Ethics Board of the Faculties of Medicine, Nursing, and Kinesiology, University of Calgary.

Outcome and explanatory factor variables

Women who reported gestational age at delivery as between 34 and 36 weeks (LP group; $n = 173$) were compared to those who reported gestational age as 37 weeks or more ($n = 2778$). We assessed perceived breastfeeding difficulties attributable to baby (i.e., trouble latching or sleepy baby), perceived breastfeeding difficulties attributable to mother (i.e., not producing enough milk or having flat or inverted nipples), and exclusive breastfeeding at 4 months postpartum among those able to breastfeed upon leaving hospital after birth. Risk factors assessed included income, ethnicity, foreign-born status, parity, mode of delivery, admission to Neonatal Intensive Care Unit (NICU) stay, infant overnight hospital stay, postpartum emotional and physical health, and postpartum maternal social support. Postpartum physical health was assessed by one item from the SF-12, "In general, how would you rate your physical health?", and dichotomized into positive and negative responses. Similarly, postpartum emotional health was assessed by, "In general, how would you rate your emotional health?" Social support was assessed using the Medical Outcomes Study Social Support Scale (MOS SSS). The MOS SSS is a 19-item, self-report questionnaire scored on a 5-point Likert scale, measuring functional social support and subscales that measure emotional/informational, affectionate, tangible, and positive social interaction.²⁹ We also assessed NICU stay and overnight hospitalization stay as potential mediators. Items from questionnaires used to derive variables of interest for the current study are shown in Appendix A.

Data analysis

All analyses were performed in Stata S/E Version 11. Demographic, obstetric, and maternal and infant health indicators and breastfeeding characteristics were examined and summarized as frequen-

cies and percentages using the Chi Square test for categorical variables and means, SDs, medians and Interquartile Range (IQR) using t-tests/Mann-Whitney tests for continuous variables. Multivariable logistic regression modeling was used to examine the independent effect of a LP birth on the odds of breastfeeding difficulties and exclusive breastfeeding at 4 months postpartum among women who were able to breastfeed upon leaving hospital after birth, compared to a term birth after controlling for known risk factors. Any variables with a p -value < 0.10 at the bivariate level were eligible for the final adjusted model. A hierarchical model-building approach was adopted by adding blocks of variables (demographic/obstetric factors, maternal and infant health indicators) in a manual stepwise fashion to the main predictor (LP birth status). Individual variables were assessed for confounding and independent effects; all excluded variables were added to the final model, one at a time, to ensure robustness of the model (likelihood ratio test).

RESULTS

Of the 2,977 women in the cohort, 2,778 delivered at term and 173 delivered between 34 and 36 weeks of gestation (26 missing). As reported in Table 1, mothers of late-preterm infants were significantly more likely to be non-Caucasian (29.6% vs. 19.5%; $p = 0.001$), foreign-born (27.2% vs. 20.3%; $p = 0.03$) and report lower household income levels (35.8% vs. 27.9%; $p = 0.03$) compared to mothers of term infants. Table 2 shows comparisons between LPs and term infants on maternal and child health indicators and breastfeeding outcomes. Mothers of late-preterm infants were more likely to have poor emotional health at 4 months postpartum compared to mothers of term infants (14.4% vs. 7.3%; $p = 0.001$). LP infants were also more likely to have stayed in the NICU (19.1 vs. 2.5%; $p < 0.001$), and have an overnight hospital stay after discharge (13.3% vs. 4.8%; $p < 0.001$) than term infants.

We performed separate multivariable logistic regression models for each breastfeeding outcome, after controlling for risk factors. Final models are shown in Table 3; each model presents odds ratios and 95% confidence intervals for the adjusted model for breastfeeding difficulties due to baby and mother/milk and exclusive breastfeeding among women able to breastfeed upon hospital discharge at birth. Only those variables that remained significant at $p < 0.05$ in the final model are shown. Mothers of LP infants were more likely to report having breastfeeding difficulties attributable to the baby (i.e., trouble latching or sleepy baby) (OR 1.72; 95% CI

1.24-2.38) than mothers of term infants at 4 months postpartum after controlling for foreign-born status, parity, mode of delivery and maternal postpartum physical health. LP status was not an independent risk factor of breastfeeding difficulties attributable to the mother/milk. Among those who were breastfeeding at discharge, mothers of LP infants were less likely than mothers of term infants to report exclusive breastfeeding at 4 months (OR 0.67; 95% CI 0.46-0.97), after controlling for household income level, mode of delivery and postpartum maternal physical health.

DISCUSSION

We assessed the independent contribution of LP births on breastfeeding difficulties and exclusivity after controlling for demographic, obstetric, maternal and infant health indicators using prospectively collected information from a community-based pregnancy cohort study.

Mothers of LP infants were more likely to be of non-Caucasian ethnicity, foreign-born, and have lower income levels than mothers of term infants. We found an association between LP births and breastfeeding difficulties attributable to the baby after adjusting for foreign-born status, parity, mode of delivery and maternal postpartum physical health. There was no independent association between LP and term birth and breastfeeding difficulties attributable to mother/milk. The association of LP birth status on breastfeeding difficulties attributable to the infant in this study corroborates previous studies that suggested that LP infants are at increased risk of breastfeeding problems.^{8,27,30} A retrospective analysis evaluating indications for LP birth found significant increases in rates of feeding problems (36% vs. 5%; $p < 0.001$) among LP ($n = 149$) and term ($n = 150$) infants, respectively. However, no details of feeding problems were provided.³⁰ Breastfeeding difficulties attributable to the infant that are common to LP infants include poor feeding skills which consequently lead to inadequate milk intake.^{21,24} LP infants are developmentally immature and are born with low energy stores and high energy demands, and often have uncoordinated suck-swallow-breathe mechanisms and limited feeding durations from tiring quickly.^{21,24} Tiring quickly when feeding limits the length and number of nutritive sucking bursts and reduces the intake of colostrum or milk.²⁴

In addition, among women who were breastfeeding on hospital discharge, LP birth status was associated with lower odds of exclusive breastfeeding at 4 months after controlling for household income level, mode of delivery and maternal postpartum physical health. This finding is supported by several studies that find that breastfeeding tends to decrease over the postpartum period within the LP population.^{27,31} The lower odds of exclusive breastfeeding can be related to breastfeeding-associated morbidities among LP infants.²³ Results from a recent review suggest that LP infants who were breastfeeding on hospital discharge and discharged to usual community supports tend to be readmitted to the hospital with diagnoses of failure to thrive, jaundice, and dehydration more frequently than full-term breastfeeding infants or infants of similar gestation who were not breastfeeding.^{23,32} A population-based cohort study involving 9,522 "healthy" singleton LP infants found that infants who were breastfed at first discharge were at higher risk (adjusted Risk Ratio(aRR)=1.65; 95% CI 1.33-2.04) of requiring subsequent hospital care in the neonatal period than their non-breastfed counterparts.³² They found that 63% of LP infants who

were readmitted to the hospital or for an observational stay had jaundice as the primary diagnosis, and 89% of those infants diagnosed with jaundice were breastfed.³² A study of 127 mother-patient pairs in Ottawa that examined whether jaundice in newborn infants increases the risk of breastfeeding discontinuation found that breastfeeding rates following the discharge of infants diagnosed with jaundice were not significantly different from those reported for the general population.³³ They reported that even when mothers were informed that jaundice was related to the breastfeeding while admitted to hospital, there was no difference in breastfeeding duration compared with mothers who were not informed.³³ In addition, receiving guidance with breastfeeding either inside or outside the hospital did not affect breastfeeding duration or age of formula introduction. However, a majority of the women reported needing help with their breastfeeding skills after hospital discharge, suggesting inadequate breastfeeding support during their infant's hospitalization. The authors speculated this may be due to physicians being ill prepared to address issues relating to breastfeeding difficulties, and to women receiving inconsistent information from their health care providers.³³

Breastfeeding is the preferred nutrition for neonates and has many advantages to infants and mothers, however not maintaining successful breastfeeding can result in failure-to-thrive and dehydration.^{23,32} In our study, NICU stay and overnight hospitalization stay were not found to mediate the association between exclusive breastfeeding and LP birth status. However, our study did not allow for the examination of specific reasons for hospitalization or NICU stay. On the other hand, we found that breastfeeding difficulties attributable to baby partially mediated the association between LP status and exclusive breastfeeding among women able to breastfeed at hospital discharge (results not shown). That is, mothers of LP infants were more likely to report having baby-related breastfeeding difficulties than mothers of term infants, which in turn was associated with lower odds of exclusive breastfeeding at 4 months postpartum. However, a prospective cohort study of 116 premature infants found that higher maternal perception of child vulnerability was not associated with lower gestational age or birth weight, but rather associated with maternal anxiety at discharge.³⁴ These findings suggest that mothers of LP infants might benefit from supplementary support in the postpartum period, especially as it relates to maternal anxiety, infant feeding and overall health.³⁴

A limitation of this study was the use of maternal self-report to assess the research objectives. Birth status was classified based on maternal report of gestational age, which may be slightly inaccurate,³⁵ and could result in the possibility of misclassification bias. However, a recent validation analysis³⁶ comparing self-report information and information obtained from electronic medical records in the AOB study showed high agreement and low risk for bias when gestational age categories were used. There may also be limitations surrounding the use of one-item measures to assess physical and emotional health. Finally, this study was limited to women who could complete a written questionnaire in English and therefore study findings may only be generalizable to women who have adequate language skills to do so. The strengths of the study include the prospective nature of data collection that minimizes the risk of recall bias, and the population-based sample that allows for study findings to be generalizable to pregnant women in urban centres in Canada.²⁸

Appendix A

Variable	Item	Scoring and/or Coding Information
Ethnicity	"How would you describe your ethnic background?"	Other/Caucasian
Foreign-born status	"Were you born in Canada?"	Yes/No
Income	"What is the total income of all household members from all sources in the past 12 months?"	≥\$80,000/<\$80,000
Parity	Combination of the following: "Have you been pregnant before?"; "Have you ever experienced a miscarriage, stillbirth, abortion, neonatal death or live birth?"	Nulliparous/Multiparous
Mode of delivery	"How was your new baby delivered?"	Vaginal/Caesarean
Baby NICU stay	"Has your baby stayed in the Neonatal Intensive Care Unit (NICU)?"	No/Yes
Baby overnight hospital stay	"Has your baby stayed overnight in the hospital (not including when he/she was first born nor NICU)?"	No/Yes
Social support at 4 months postpartum	Medical Outcomes Survey Social Support Scale A cut-off of 69 or greater was used to define adequate social support.	Adequate /Inadequate
Emotional health at 4 months postpartum	"In general, how would you rate your emotional health?"	Good/Poor
Physical health at 4 months postpartum	"In general, how would you rate your physical health?"	Good/Poor
Breastfeeding difficulties attributable to baby	"As a result of breastfeeding your baby, have you experienced difficulties with the baby such as the baby having trouble latching or having a sleepy baby?"	No/Yes
Breastfeeding difficulties attributable to mother/milk	"As a result of breastfeeding your baby, have you experienced difficulties such as not producing enough milk, or having flat or inverted nipples?"	No/Yes
Exclusive breastfeeding at 4 months postpartum	"In the past week, what best describes what your baby was fed?"	Not EBF/EBF

CONCLUSION

LP infants may seem similar to their term birth peers, however, they are less mature, and mothers of LP infants are at increased risk for baby-related breastfeeding difficulties and have lower rates of exclusive breastfeeding at 4 months. Increased support and care should be provided for these mothers to optimize breastfeeding successes, monitor health, and optimize growth and development.

REFERENCES

1. March of Dimes, The Partnership for Maternal, Newborn & Child Health, Save the Children, WHO. *Born Too Soon: The Global Action Report on Preterm Birth*. Geneva, Switzerland: WHO, 2012.
2. Engle WA, Tomashek KM, Wallman C. "Late-preterm" infants: A population at risk. *Pediatrics* 2007;120(6):1390-401.
3. Joseph KS, Allen AC, Dodds L, Vincer MJ, Armson BA. Causes and consequences of recent increases in preterm birth among twins. *Obstet Gynecol* 2001;98(1):57-64.
4. Canadian Institute for Health Information. *Too Early, Too Small: A Profile of Small Babies Across Canada*. Ottawa, ON: CIHI, 2009. Available at: https://secure.cihi.ca/free_products/too_early_too_small_en.pdf (Accessed May 13, 2013).
5. McCormick MC, Litt JS, Smith VC, Zupancic JA. Prematurity: An overview and public health implications. *Annu Rev Public Health* 2011;32:367-79.
6. Quigley MA, Poulsen G, Boyle E, Wolke D, Field D, Alfirevic Z, Kurinczuk JJ. Early term and late preterm birth are associated with poorer school performance at age 5 years: A cohort study. *Arch Dis Child Fetal Neonatal Ed* 2012;97(3):F167-F173.
7. Talge NM, Holzman C, Wang J, Lucia V, Gardiner J, Breslau N. Late-preterm birth and its association with cognitive and socioemotional outcomes at 6 years of age. *Pediatrics* 2010;126(6):1124-31.
8. McDonald SW, Benzie KM, Gallant JE, McNeil DA, Dolan SM, Tough SC. A comparison between late preterm and term infants on breastfeeding and maternal mental health. *Matern Child Health J* 2012 Oct 7 [Epub ahead of print].
9. Brandon DH, Tully KP, Silva SG, Malcolm WF, Murtha AP, Turner BS, Holditch-Davis D. Emotional responses of mothers of late-preterm and term infants. *J Obstet Gynecol Neonatal Nurs* 2011;40(6):719-31.
10. Saigal S, Doyle LW. An overview of mortality and sequelae of preterm birth from infancy to adulthood. *Lancet* 2008;371(9608):261-69.
11. Stephens BE, Vohr BR. Neurodevelopmental outcome of the premature infant. *Pediatr Clin North Am* 2009;56(3):631-46, Table of Contents.
12. Doyle LW, Anderson PJ. Adult outcome of extremely preterm infants. *Pediatrics* 2010;126(2):342-51.
13. ESPGHAN Committee on Nutrition, Agostoni C, Braegger C, Decsi T, Kolacek S, Koletzko B, Michaelsen KE, et al. Breast-feeding: A commentary by the ESPGHAN Committee on Nutrition. *J Pediatr Gastroenterol Nutr* 2009;49(1):112-25.
14. Cai X, Wardlaw T, Brown DW. Global trends in exclusive breastfeeding. *Int Breastfeed J* 2012;7(1):12.
15. Public Health Agency of Canada. *What Mothers Say: The Canadian Maternity Experiences Survey*. Ottawa: PHAC, 2009.
16. World Health Organization. *Global Strategy for Infant and Young Child Feeding*. Geneva, Switzerland: WHO, 2003.
17. Kehler HL, Chaput KH, Tough SC. Risk factors for cessation of breastfeeding prior to six months postpartum among a community sample of women in Calgary, Alberta. *Can J Public Health* 2009;100(5):376-80.
18. Dennis CL. Breastfeeding initiation and duration: A 1990-2000 literature review. *J Obstet Gynecol Neonatal Nurs* 2002;31(1):12-32.
19. Lande B, Andersen LF, Baerug A, Trygg KU, Lund-Larsen K, Veierød MB, Bjørneboe GE. Infant feeding practices and associated factors in the first six months of life: The Norwegian infant nutrition survey. *Acta Paediatr* 2003;92(2):152-61.
20. Coulibaly R, Seguin L, Zunzunegui MV, Gauvin L. Links between maternal breast-feeding duration and Quebec infants' health: A population-based study. Are the effects different for poor children? *Matern Child Health J* 2006;10(6):537-43.
21. Adamkin DH. Feeding problems in the late preterm infant. *Clin Perinatol* 2006;33(4):831-37; abstract ix.
22. Meier PP, Furman LM, Degenhardt M. Increased lactation risk for late preterm infants and mothers: Evidence and management strategies to protect breast-feeding. *J Midwifery Womens Health* 2007;52(6):579-87.
23. Radtke JV. The paradox of breastfeeding-associated morbidity among late preterm infants. *J Obstet Gynecol Neonatal Nurs* 2011;40(1):9-24.
24. Walker M. Breastfeeding the late preterm infant. *J Obstet Gynecol Neonatal Nurs* 2008;37(6):692-701.
25. Kirchner L, Jettler V, Waldhor T, Pollak A, Wald M. Long hospitalization is the most important risk factor for early weaning from breast milk in premature babies. *Acta Paediatr* 2009;98(6):981-84.
26. Maia C, Brandao R, Roncalli A, Maranhao H. Length of stay in a neonatal intensive care unit and its association with low rates of exclusive breastfeeding in very low birth weight infants. *J Matern Fetal Neonatal Med* 2011;24(6):774-77.
27. Colaizy TT, Morriss FH. Positive effect of NICU admission on breastfeeding of preterm US infants in 2000 to 2003. *J Perinatol* 2008;28(7):505-10.
28. McDonald SW, Lyon AW, Benzie KM, McNeil DA, Lye SJ, Dolan SM, et al. The All Our Babies pregnancy cohort: Design, methods, and participant characteristics. *BMC Pregnancy Childbirth* 2013;13(Suppl 1):S2.
29. Sherbourne CD, Stewart AL. The MOS social support survey. *Soc Sci Med* 1991;32(6):705-14.
30. Lubow JM, How HY, Habli M, Maxwell R, Sibai BM. Indications for delivery and short-term neonatal outcomes in late preterm as compared with term births. *Am J Obstet Gynecol* 2009;200(5):e30-e33.
31. Donath SM, Amir LH. Effect of gestation on initiation and duration of breast-feeding. *Arch Dis Child Fetal Neonatal Ed* 2008;93(6):F448-F450.
32. Shapiro-Mendoza CK, Tomashek KM, Kotelchuck M, Barfield W, Weiss J, Evans S. Risk factors for neonatal morbidity and mortality among "healthy," late preterm newborns. *Semin Perinatol* 2006;30(2):54-60.

BREASTFEEDING OF LATE PRETERM INFANTS

33. Pound CM, Gaboury I. The impact of jaundice in newborn infants on the length of breastfeeding. *Paediatr Child Health* 2009;14(7):445-49.
34. Allen EC, Manuel JC, Legault C, Naughton MJ, Pivor C, O'Shea TM. Perception of child vulnerability among mothers of former premature infants. *Pediatrics* 2004;113(2):267-73.
35. Oates RK, Forrest D. Reliability of mothers' reports of birth data. *Aust Paediatr J* 1984;20(3):185-86.
36. Bat-Erdene U, Metcalfe A, McDonald SW, Tough SC. Validation of Canadian mothers' recall of events in labour and delivery with electronic health records. *BMC Pregnancy Childbirth* 2013;13(Suppl 1):S3.

Received: December 14, 2012

Accepted: July 24, 2013

RÉSUMÉ

OBJECTIF : Comparer les difficultés à allaiter imputables au bébé et celles imputables à la mère/au lait et la pratique de l'allaitement maternel exclusif entre un groupe de nourrissons peu prématurés (PP) et de nourrissons nés à terme.

MÉTHODE : Nous nous sommes servis des données d'une cohorte communautaire prospective (n=2 977) à Calgary, en Alberta, pour effectuer des analyses bivariées et multivariées afin de cerner les indicateurs de santé démographiques, obstétriques, maternels et du nourrisson indépendamment associés à la naissance à terme et aux résultats de l'allaitement maternel.

RÉSULTATS : Selon nos analyses multivariées, le statut PP était un facteur de risque indépendant pour les difficultés d'allaitement imputables au bébé (RC 1,72, IC de 95 % 1,24-2,38), mais pas pour les difficultés imputables à la mère/au lait (définies comme ne produisant pas assez de lait ou ayant des mamelons plats ou invertis). Chez les femmes qui allaitaient à leur sortie de l'hôpital, les mères de nourrissons PP étaient moins susceptibles de déclarer pratiquer l'allaitement maternel exclusif à 4 mois (RC 0,67, IC de 95 % 0,46-0,97), après prise en compte du revenu du ménage, du mode d'accouchement et de la santé physique maternelle post-partum.

CONCLUSIONS : Les mères de nourrissons PP ont besoin de soutien supplémentaire pour allaiter avec succès et pour que leurs nourrissons profitent entièrement des avantages du lait maternel.

MOTS CLÉS : allaitement maternel; nourrisson, prématuré; épidémiologie