

The Effect of Labor Pain Relief Medication on Neonatal Suckling and Breastfeeding Duration

Jan Riordan, EdD, RN, FAAN, Aimee Gross, RN, MSN, Judy Angeron, RN, BA, Becky Krumwiede, RN, and Jeri Melin, RN, BSN

Abstract

We examined the relationship of labor pain relief medications with neonatal suckling and breastfeeding duration in 129 mothers delivering vaginally. Suckling was measured using the Infant Breastfeeding Assessment Tool (IBFAT). Controlling for infant age, birthweight, and gender, infants of unmedicated mothers had higher IBFAT suckling scores than those of medicated mothers ($\bar{x} = 11.1$ vs. $\bar{x} = 8.2$ respectively, $P = .001$). IBFAT suckling scores for intravenous and epidural groups were similar ($\bar{x} = 8.5$) while those who received a combination of both intravenous and epidural medications were lower ($\bar{x} = 6.4 \pm 2.96$, $P = .001$). Mothers evaluated their breastfeeds similarly to nurse evaluators ($Z = 9.39$, $P = .001$). Breastfeeding duration did not differ between unmedicated and medicated groups; however, dyads with low IBFAT scores weaned earlier than those with medium or high scores. Labor pain relief medications diminish early suckling but are not associated with duration of breastfeeding through 6 weeks postpartum. *J Hum Lact* 2000; 16(1) 7-12.

Keywords: epidurals, intravenous, breastfeeding, labor, childbirth, pain relief

The use of labor pain relief medication is a controversial issue that has engendered heated discussions among health care professionals about safety, interference with labor, and birthing. Lactation consultants have also expressed concerns that there may be a negative impact of analgesia during labor on breastfeeding outcomes. Many believe that use of labor analgesia causes neo-

nates to exhibit disorganized, ineffective suckling at the breast. In some cases, breastfeeding difficulties may lead to early unintended weaning.¹

Epidural analgesia during labor, administered in the epidural space between the dura and the ligamentum flavum, allows for pain relief while minimizing the level of medication into the maternal bloodstream as compared with intravenous administration.² It is common to combine a regional anesthetic (bupivacaine, xylocaine) with a narcotic (fentanyl, sufentanil, morphine) to potentiate the action so that a lower dose of narcotic and anesthetic is needed.³ Bupivacaine is the most commonly used epidural analgesia during labor, in part because of its long duration of action and low incidence of side effects. However, bupivacaine enters the maternal blood stream rapidly from the epidural space and crosses the placenta. Thus, measurable concentrations are present in the fetal circulation within 10 minutes of the injection.⁴ The concentration of epidural analgesia typically used for pain relief has progressively lowered over the years as it has become evident that lower doses

Received for review, August 21, 1998; revised manuscript accepted for publication, July 8, 1999.

Jan Riordan is an Associate Professor at Wichita State University. **Aimee Gross** is a Clinical Nurse Specialist at St. Francis Hospital, Topeka, KS. **Judy Angeron** is a Lactation Consultant at Via Christi Health Systems, Wichita, KS. **Becky Krumwiede** is a Lactation Consultant at Appleton Medical Center, Appleton, WI. **Jeri Melin** is a Lactation Consultant at Via Christi Health Systems, Wichita, KS. Address correspondence to Jan Riordan EdD, RN, FAAN, School of Nursing, Wichita State University, 1845 N. Fairmount, Box 41, Wichita, KS 67260-0041.

This study was supported by the Kansas Health Foundation and Wichita State University, School of Nursing, Wichita, Kansas.

J Hum Lact 16(1), 2000

© Copyright 2000 International Lactation Consultant Association

are as effective as higher concentrations and result in better infant outcomes.^{3,5,6}

Studies examining the effect of epidural analgesia during labor on breastfeeding outcomes typically compare birth outcomes among women who receive various types and dosages of labor medications; few include women who received no analgesia during labor. For instance, Scanlon⁷ compared neonatal neurobehavior responses between an epidural analgesia group and a nonepidural group. However, the nonepidural group received either low spinal or local anesthesia or intravenous narcotics during labor. In a frequently cited study of the effect of intravenous meperidine on neonatal suckling, the control group of mothers received either nitrous oxide or epidural analgesia during labor.⁸

A number of studies have documented that narcotics given parenterally (intravenously [IV], intramuscularly [IM]) for pain relief during the intrapartum period decrease neonatal alertness,⁹ inhibit suckling,¹⁰ lower neurobehavioral scores,¹¹ and delay effective feeding.^{12,13} Meperidine (Demerol), when given parenterally during labor, especially diminishes and delays neonates' suckling.^{8,9,10,14} Typically, assessments of breastfeeding behaviors have not been included in these studies. The most common infant assessments used, the Brazelton Neonatal Behavior Assessment Scale (BNBAS) and the Early Neonatal Neurobehavior Scale (ENNS), do not assess breastfeeding behaviors directly. Because relatively few studies have included breastfeeding outcomes when examining the effects of labor analgesia, this prospective, multisite study was undertaken to determine if the use of analgesia during labor is associated with poor infant suckling and a shorter duration of breastfeeding.

Methods

Sample

The sample consisted of 129 mother-infant dyads delivered at one of three midwestern hospitals, either at a teaching hospital in a large city or one of two community hospitals in mid-sized cities. Lactation consultants collected data during September 1995, May 1996, and June 1997. The sample consisted of newly delivered mothers who were visited during their hospital stay by lactation consultants conducting daily rounds on an as-they-come basis. The sample excluded infants born less than 38 or more than 42 weeks gestation, and those admitted to the neonatal intensive care, or delivered by cesarean section. Multiple births and mothers receiving

general anesthesia for delivery were also excluded. No eligible mothers refused to participate. Dyads were followed to 6 weeks postpartum.

Breastfeeding Outcomes Assessment

The Infant Breastfeeding Assessment Tool (IBFAT) was used to assess neonatal suckling effectiveness during a quiet time in the mother's hospital room. The IBFAT measures four components of infant breastfeeding effectiveness: readiness to feed, rooting, fixing, and suckling. The range of scores for each of the four components is 0 to 3; thus, the total score can range from 0 to 12, with a higher score representing more vigorous, effective suckling.¹⁵ The IBFAT also measures the mother's perception of and satisfaction with the feeding. Interrater reliability was found to be satisfactory in one study¹⁶ but unsatisfactory in another.¹⁷

The four evaluators were nurses certified as lactation consultants who had a minimum of 3 years experience working with breastfeeding dyads. By analysis of covariance controlling for infant age, there were no significant differences in mean IBFAT scores among the nurse evaluators ($P=.262$). The evaluators generally did not know the anesthetic or analgesic management at the time of the breastfeeding assessments.

Mothers in the study were called at about 6 weeks postpartum and asked about the length of breastfeeding. The proportions of participants successfully contacted in the unmedicated (68%) and medicated (77%) groups were similar. Breastfeeding duration was defined as the postpartum week in which the mother had not breastfed in the past 24 hours and did not intend to breastfeed the baby further. Breastfeeding duration was categorized as <2 weeks, >2 but <4 weeks, >4 but <6 weeks or 6 weeks postpartum.

Labor Medications

Type of analgesia used and protocols for each of the medications were similar at all sites. Combined bupivacaine and fentanyl were the most commonly used epidural medications. Administration concentrations of bupivacaine ranged from 0.125% to 0.5%. Lidocaine (2%) and chloroprocaine (2%) were used in a few instances instead of bupivacaine. Although fentanyl dosages ranged from 25 to 200 μg , 50-100 μg was most commonly used. Sufentanil (25-50 μg) was used in one hospital instead of fentanyl. Dosage ranges of intravenous labor medications were 25-50 mg for meperidine (50-100 mg IM), 5-10 mg for nalbuphine, and 0.5-2 mg

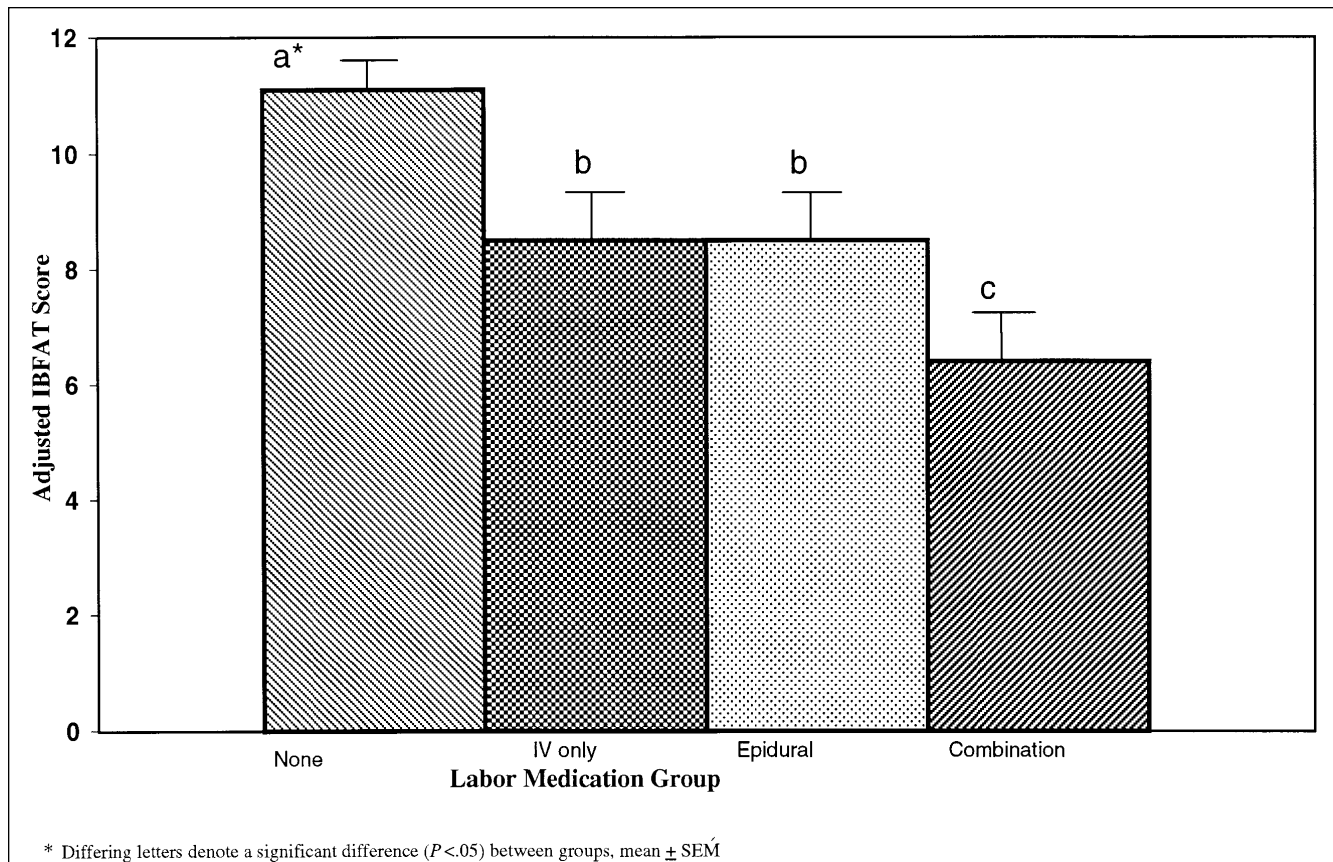


Figure 1. Adjusted mean IBFAT score by medicated group.

for butorphanol. Intravenous medications were given as a slow push over 1 minute.

As expected, dosages of labor medications given to individual mothers varied. Hospital records often omitted the length of time the drug was administered; thus, it was not possible to calculate total dosage of analgesia for each delivery from the patient anesthesia records. Therefore, mothers were categorized into groups that had received (1) no labor pain analgesia, (2) only epidural analgesia, (3) only intravenous narcotics, or (4) both epidural and intravenous analgesia.

Data were analyzed using StatView, Version 5.0.1 (SAS Institute, Inc.). ANCOVA was used to examine variables that might affect suckling scores. Birth weight was used as a covariate owing to its established link to early suckling ability. Given empirical evidence that infant gender is related to a delay in suckling ability,¹² this was controlled in the analyses. In addition, the age (in hours) at which the assessment was performed was controlled because suckling improves with age as the infant develops and learns. The Mann-Whitney U and

the Kruskal-Wallis Tests for ordinal data were used to compare breastfeeding duration between medication groups and levels of LATCH scores, respectively. Descriptive statistics were used to determine means and standard deviations of demographic and clinical variables. When probability values of $P < .001$ were found for the main group effects, the Post-Hoc Fisher's Protected Least Significant Difference was used to determine specific paired differences.

Results

Mothers in the sample were an average of 28 ± 5 years old, and 45% were breastfeeding for the first time. Neonates were singleton, term babies weighing an average of 3477 ± 479 g at birth. Half were males. Twenty-nine percent of the mothers had an unmedicated vaginal delivery (NOMED group), and 71% had either epidural or intravenous narcotic medication or both (MED group).

Table 1 compares subject characteristics between groups. Infant birth weight and gender did not differ sig-

Table 1. Characteristics of subjects.

	Unmedicated n= 37 (29%)	Medicated n= 92 (71%)
Infant gender, % male	48	52
First time breastfeeder, n (%)	14 (38)	48 (52)
Birth weight, g, $\bar{x} \pm SD$	3455 \pm 388	3455 \pm 513
Hospital 1, n (%)	3 (11)	25 (89)*
Hospital 2, n (%)	12 (39)	19 (61)
Hospital 3, n (%)	22 (31)	48 (69)
Maternal age, y, $\bar{x} \pm SD$	29 \pm 5	27 \pm 5**
Assessment age, h, $\bar{x} \pm SD$	7 \pm 9	12 \pm 14**

* $P < .05$ chi-square analysis. ** $P < .05$ Student's *t*-test.

nificantly nor did the percentage of mothers who were breastfeeding for the first time. Mothers in the NOMED group were significantly older, and their breastfeeding was assessed significantly earlier than those in the MED group. The average suckling score was 9.0 and ranged from 0 to 12. The age the assessment took place ranged from 1 to 50 hours postpartum, the mean was 10.7 hours. Most of the mothers (72%) were still breastfeeding at 6 weeks postpartum; however, 18% had weaned by 2 weeks.

The results of the ANCOVA model comparing IBFAT scores between infants of medicated and non-medicated mothers, including infant gender, age, and birth weight as covariates, showed that gender and birth weight were not significant; thus, they were not included in further analyses. Mean suck scores were significantly different between the MED and NOMED groups, and infant age was a significant covariate. Controlling for infant age, adjusted mean LATCH scores were 11.1 ± 0.9 and 8.2 ± 3.3 for the NOMED and MED groups, respectively ($P < .0001$).

Further analysis examined mean IBFAT score by type of labor pain medication. Subjects were grouped into those who had received (1) no labor pain analgesia ($n=37$), (2) only epidural analgesia ($n=27$), (3) only intravenous analgesia ($n=52$), or (4) both epidural and intravenous analgesia ($n=13$). Suckling scores of each group were compared using an ANCOVA that controlled for infant age. By post hoc analysis, infants of women who had no labor pain analgesia had significantly higher suckling scores (11.1 ± 0.9) than any of the other three groups ($F=13.83$, $P < .0001$). Adjusted mean scores were the same for both the intravenous (8.5 ± 3.2) and epidural (8.5 ± 3.4) groups. The group who had both intravenous and epidural labor pain medication had significantly lower suckling scores (6.4 ± 3.0) than the other three groups. (see Figure 1).

Table 2. Distribution of route of labor pain medication administration.

Route	Medication	Number
Unmedicated for pain	None	37
Intravenous (IV) pain medication only	Butorphanol, meperidine, nalbuphine	52
Epidural pain medication only	Bupivacaine, lidocaine, chloroprocaine in combination with fentanyl, sufentanil	27
Combination (IV and epidural) pain medication	Combinations of medications as above	13

Mothers who had no labor pain relief medication did not breastfeed significantly longer than those who were medicated ($Z=-0.71$, $P=.54$). IBFAT scores were then divided into three groups: low (0-4), medium (5-8), and high (9-12), and compared with duration of breastfeeding. Dyads with low scores breastfed for a significantly shorter period of time than those with medium or high scores ($H=107.7$, $P < .001$).

Finally, a Spearman correlation was performed to determine if the mothers' feeding assessment scores were similar to those of the nurse observers. The IBFAT scores of these two groups were positively correlated ($Z=9.39$, $P < .0001$).

Discussion

In almost all previous studies of the potential effects of the use of epidural analgesia during labor, assessment of the infant has been limited to a neurobehavioral or Apgar score. These tools neither reflect the complex behaviors of feeding at the breast nor include maternal factors. In the present study, a valid tool developed specifically to measure suckling at the breast was used to assess infant behavior. Furthermore, this assessment included the mothers' evaluation in addition to that of the nurse evaluators. Breastfeeding outcomes in groups of infants whose mothers had received labor analgesia were compared with those of infants whose mothers had not received analgesia. Although this study was limited by the lack of detailed information regarding labor medication dosages and intrapartum events, it is the first study examining the effects of labor medication on the infant to assess breastfeeding outcomes directly and include unmedicated mothers as a control group.

This study confirms previous studies^{8,10,11,13} that have demonstrated intravenous analgesia diminishes neonatal suckling. This study also found that the effect of

epidural analgesia on suckling is similar to that of medications given intravenously. Although blood samples were not taken in this study, it is likely that infants of women receiving both epidural and parenteral medications would have higher serum levels of labor medications and thus be at greater risk for poor suckling than those receiving one type.

Mothers' evaluations of the feedings were similar to that of the lactation consultants. Matthews¹⁶ also found that mothers' feeding scores were positively correlated with evaluators' IBFAT feeding scores. These findings suggest that mothers, given specific guidelines, are competent to evaluate how well breastfeeding is going. The significant associations between low IBFAT scores and breastfeeding duration and between maternal and nurse evaluator scores support the validity of the IBFAT tool.

Three studies have examined the effects of the use of labor epidurals on neonatal neurobehavior using a control group of mothers who received minimal or no medication. Murray et al.¹⁸ studied the effects of epidural analgesia on neonates. Infants were grouped according to whether their mothers received (1) continuous infusion of 0.25% bupivacaine epidurally ($n=20$), (2) the same medication as group 1 in combination with oxytocin to stimulate labor ($n=20$), or (3) no medication during childbirth ($n=15$). Nine of the 15 mothers in the no medication group briefly inhaled nitrous oxide, and 11 received lidocaine for perineal infiltration. The BNBAS was used to measure neonatal neurobehavior. After excluding five infants from the no medication group because of extremely high levels of lidocaine in the maternal serum, the authors found that infants in both epidural groups performed significantly less well on the BNBAS motor, state control, and physiologic response clusters than those in the NOMED group. By the fifth day, infants in the epidural groups continued to show poor state organization.

In 1982, Abboud et al.¹⁹ compared fetal, maternal, and neonatal responses following epidural administration of one of three regional anesthetics (lidocaine, bupivacaine, or 2-chloroprocaine; $n=50$ mother infant pairs in each group) and in an unmedicated control group ($n=20$). No narcotic, such as fentanyl, was used for the epidurals. Neonatal behavior was evaluated using the Early Neonatal Neurobehavior Scale (EENS) at 2 and 24 hours of life. Data analysis consisted of calculating the percentage of neonates with high scores and comparing each group with chi-square analysis. Compared with those in the epidural groups, infants in the unmedicated groups generally scored lower in suckling and

rooting at both 2 and 24 hours postpartum. Although this is a counterintuitive finding, the women were given small doses of regional anesthesia (lidocaine, bupivacaine, and 2-chloroprocaine) and did not receive the same narcotics, such as fentanyl, that are commonly given now. Abboud²⁰ later repeated the study using a larger dose of lidocaine. Again, the percentage of neonates with high suckling and rooting scores at 2 hours postpartum was higher in the lidocaine group than in the unmedicated group. However, at 24 hours the situation was reversed: The percentage of infants with high postpartum suckling scores was higher in the unmedicated group than in the lidocaine group.

Corke²¹ found that neonates in the United Kingdom whose mothers had no epidural analgesia during labor tended to have lower scores in rooting and suckling ability at 4 hours postpartum than infants whose mothers had received epidural medications; however, these differences were not statistically significant and the study included only a small sample of infants.

Lack of a positive relationship between the use of any epidural analgesia during labor and the duration of breastfeeding is puzzling since it is thought that mothers who have unmedicated births breastfeed for a longer period of time than those who choose to have epidural analgesia during labor. However, breastfeeding duration was measured only at 6 weeks, and therefore any relationship between epidural medication and extended breastfeeding could not be examined.

This study was limited in that other perinatal events that may play an important role in neonatal suckling, such as the use of oxytocin, vacuum extraction, forceps, and oral suctioning were not included in the study. Random assignment of study participants to labor pain medication groups was not possible. The lack of information regarding timing of administration and total dosages of the analgesics also limited the scope of this study.

The results of this study indicate that labor medications impair suckling in the early postpartum period. Therefore, lactation consultants should be concerned that breastfeeding mothers who have received labor medications may become discouraged, especially if they are discharged before effective breastfeeding is established. If mothers lack adequate support at home or did not receive follow-up care, babies with poor breastfeeding behaviors are at greater risk for dehydration, jaundice, and poor weight gain.²²

Nonpharmacological methods of pain control for labor such as paced breathing, position change, massage, therapeutic touch, visualization, relaxation, and

hydrotherapy are effective²³ and do not compromise early neonatal suckling and breastfeeding. If epidural analgesia is given, it appears that the best choice is a local anesthetic that does not include a narcotic.^{19,20}

Informed consent constitutes knowing all the consequences of treatment.²⁴ Women should be informed that their infants' ability to breastfeed is diminished with epidural analgesia. Although satisfying maternal needs at the expense of the infant is a difficult balance of choice, health professionals are the guardians of health, not purveyors of costly interventions. The public trusts health professionals to tell them the truth about possible consequences of medical treatments. Therefore, information about the potential effects of labor medications should be included in childbirth classes along with discussion of pregnancy, labor, delivery, and breastfeeding as normal life events.

References

- Walker M. Do labor medications affect breastfeeding? *J Hum Lact*. 1997;13:131-137.
- Biascella S. Epidural anesthesia. *J Perinat Educ*. 1994;3(4):67-69.
- Youngstrom PC, Baker SW, Miller JL. Epidurals redefined in analgesia and anesthesia: A distinction with a difference. *J Obstet Gynecol Neonatal Nurs*. 1996;24:350-354.
- Rosenblatt DB, Belsy EM, Redshaw M, Caldwell J, Notarianni L, Beard RW. The influence of maternal analgesia on neonatal behaviour: 11. Epidural bupivacaine. *Br J Obstet Gynaecol*. 1981;88:407-413.
- Bader AM, Fragneto R, Katsuo T, Arthur R, Loferski B, Datta S. Maternal and neonatal fentanyl and bupivacaine concentrations after epidural infusion during labor. *Obstet Anesth*. 1995;81:407-413.
- Morton SC, Williams MS, Keeler EB, Gambone JC, Kahn KL. Effect of epidural analgesia for labor on the Cesarean delivery rate. *Obstet Gynecol*. 1994;83:1045-1052.
- Scanlon JW, Brown WU, Weiss JB, Alper MH. Neurobehavioral responses of newborn infants after maternal epidural anesthesia. *Anesthesiology*. 1974;40(2):121-128.
- Righard L, Alade MO. Effect of delivery room on success of first breast-feed. *Lancet*. 1990;336:1105-1107.
- Belsy EM, Rosenblatt DB, Lieberman BA, et al. The influence of maternal analgesia on neonatal behaviour: 1. Pethidine. *Br J Obstet Gynaecol*. 1981;88:398-406.
- Kron RE, Stein M, Goddard KE. Newborn sucking behaviour affected by obstetric medication. *Pediatrics*. 1966;37:1012-1016.
- Hodgkinson R, Bhatt M, Wang CM. Double blind comparison of the neurobehavior of neonates following administration of different doses of meperidine to the mother. *Can Anesth Soc*. 1978;25:405-411.
- Crowell MK, Hill PD, Humenick SS. Relationship between obstetric analgesia and time of effective breastfeeding. *J Nurse Midwifery*. 1994;39(3):150-156.
- Matthews MK. The relationship between maternal labour analgesia and delay in the initiation of breastfeeding in healthy neonates in the early neonatal period. *Midwifery*. 1989;5:3-10.
- Hodgkinson R, Husain F. The duration of effect of maternally administered meperidine on neonatal neurobehavior. *Anesthesiology*. 1982;40:116-120.
- Matthews MK. Developing an instrument to assess infant breastfeeding behaviour in the early neonatal period. *Midwifery*. 1988;4:154-165.
- Matthews MK. Mothers' satisfaction with their neonates' breastfeeding behaviors. *J Obstet Gynecol Neonatal Nurs*. 1991;20:49-55.
- Riordan J, Koehn M. Reliability and validity testing of three breastfeeding assessment tools. *J Obstet Gynecol Neonatal Nurs*. 1997;26:181-187.
- Murray AD, Dolby RM, Nation RL, Thomas DB. Effects of epidural anesthesia on newborns and their mothers. *Child Dev*. 1981;52:71-82.
- Abboud TK, Khoo SS, Miller F, Doan T, Henriksen EH. Maternal, fetal, and neonatal responses after epidural anesthesia with bupivacaine, 2-chloroprocaine, or lidocaine. *Anesth Analg*. 1982;61:638-644.
- Abboud TK, Sarkis F, Blikian A, Varakian L, Earl S, Henriksen E. Lack of adverse neonatal neurobehavioral effects of lidocaine. *Anesth Analg*. 1983;62:473-475.
- Corke BC. Neurobehavioural responses of the newborn. *Anaesthesia*. 1977;32:539-543.
- Maisels MJ, Kring E. Length of stay, jaundice, and hospital readmission. *Pediatrics*. 1998;101:995-998.
- CNM Data Group. 1996. Midwifery management of pain in labor. *J Nurse Midwifery*. 1998;43:77-82.
- Mann DH, Albers LL. Informed consent for epidural analgesia in labor. *J Nurse Midwifery*. 1997;42:389-392.

Efecto de medicamentos analgésicos utilizados durante el parto sobre la succión neonatal y la duración de la lactancia materna

Resumen

Este estudio evaluó el efecto que tienen los medicamentos analgésicos utilizados durante el parto en la succión neonatal y la duración de la lactancia materna en 129 madres con parto vaginal. La succión se evaluó utilizando el instrumento: "Infant Breastfeeding Assessment Tool (IBFAT)". Niños de madres sin medicamentos, controlando edad, peso al nacer y género, mostraron puntajes de succión IBFAT más altos que aquellos de madres medicadas ($x=11.1$ vs $x=8.2$ respectivamente, $P=.001$). Los puntajes de succión IBFAT en los grupos de medicación intravenoso y epidural fueron similares ($x=8.5$) mientras aquellos recibiendo medicamentos combinados de ambas intravenosa y epidural fueron menores ($x=6.4 \pm 2.96$, $P=.001$). La evaluación de las madres de cada mamada fue similar a las evaluaciones de las enfermeras ($Z=9.39$, $P=.0001$). La duración de la lactancia no era diferente entre el grupo medicado y no medicado; aunque, parejas con bajos puntajes de IBFAT suspendieron la lactancia mas temprano que aquellos con puntajes medios o altos ($P=.001$). Medicamentos analgésicos utilizados durante el parto pueden disminuir la succión temprana pero no están asociados a la duración de la lactancia a las 6 semanas postparto.