The Effect of Meperidine on Peripartum Breastfeeding and Neonatal Weight

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Abstract

Objective: To evaluate the effect of Meperidine, commonly administered for labor analgesia, on newborn weight and peripartum breastfeeding during two months after delivery.

Materials and methods: This pilot cohort study was conducted between October 2010 and October 2011 at the Women Hospital of the Tehran University of Medical Sciences. In this study, we examined the effects of meperidine on breastfeeding and neonatal weight. A total number of 184 full term pregnant women, planned to deliver at this center (normal vaginally delivery or cesarean), participated in this study. The study group included the women who received meperidine in peripartum time to be compared with a control group who did not receive any opioid. Meperidine was administrated to them based on their peripartum breastfeeding behaviour and baby weight, two month after delivery.

Results: Of the 184 woman recruited to the trial, 38 women had normal vaginal delivery and 146 had ccesarean. Within the first two-month, 4% of mothers in control group and 11% of meperidine group used formula. However, this differences were not statistically significant (p value= 0.07). Furthermore, baby weight distribution was not statistically different between two groups.

Conclusion: The inhibitory effect of using Meperidine on peripartum breastfeeding and weight of newborn in the first two months was not statistically significant in this study. More research is needed to clarify the association between meperidine and peripartum breastfeeding.

Keywords: Peripartum, Meperidine, Neonatal Weight, Breastfeeding

Introduction

One of the most severe pains that women experience during their life is labor pain (1). First medical form for labor pain relief was introduced in the mid-nineties. There have been yet many controversies about these techniques, also many physicians believe labor pain is natural and essential in natural birth (2). Drug administrated in control of labor pain are divided in two groups, systemic and local. The systemic methods includes intramuscular, intravenous

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or inhaled while the regional methods includes epidural, spinal and combined spinal – epidural (3).

The most common systemic medications are agonist (morphine, fentanyl, and meperidine) or agonist-antagonist (nalbuphine, butorphanol) opioids. Opioids influence nervous system of mother, yet a part of it crosses the placenta and affects the fetus (4). It is noted that meperidine, applied subcutaneous; intramuscular; intravenous; and oral, is the most common systemic opioid used for labor analgesia in the world. Although, its use has declined in the USA to replace by more effective opioid substitution with lower harmful side effects. Meperidine is administrated by midwives through intramuscular or subcutaneous injection in doses between 50-150 mg based on the patient's response, every one-three hours (5). The interval between application of meperidine and time of delivery may effects the newborn. The exposure of most newborns to meperidine is estimated to be two-three hours after its application while this time is more than four hours for meperidine metabolites(6).

Breastfeeding is so important; it is an exclusive nutrition up to six months, and then use as a supplementary nutrition (7). The full development reflects the health and nutritional status of children, which present the child's weight, as well (8). Considering growth factor commonly measuring in children, height and weight are expressed as a better measurement tool to demonstrate their nutrition condition in the near past. So, it seems that the effects of labor analgesia on breastfeeding and weight of newborn are so important to be investigated.

There are few studies specially examined the relationship of breastfeeding and labor analgesia. In a video recorded to evaluate 28 newborns' nutritional habit showed breastseeking and breastfeeding were reduced in the newborns whose mothers received analgesia (9).

In another study, Halpern et al. (10) have found no effects of labor epidural anesthesia on breastfeeding during six to eight weeks follow up in 171 women. In addition, the study of feeding behaviours and weight loss in 181 newborns by Rosen et al. (11) has found no association between epidural analgesia and breastfeeding.

A study by Riordan et al.(12) has revealed the relationship between labor analgesia medications and breastfeeding using a breastfeeding assessment tool in order to measures infant readiness, rooting, fixing, and suckling to achieve early breastfeeding behavior in period of 6 weeks. This study has found that applying medications to relief labor pain may decline early suckling, but there is no relationship between analgesia and duration of breastfeeding. Beilin et al. (13) have studied the effect of epidural fentanyl on breastfeeding. They gathered data, in period of six weeks, from the mothers in their first 24-hour breastfeeding. Their results revealed that mothers who received more than 150 µg of fentanyl showed a trend to continue breastfeeding in comparison to those who received lesser amount..

In another study by Nissen et al. (14), the effects of meperidine during labor on infants' breastfeeding behavior have been examined. They have found that to use intramuscular application of 100 mg of meperidine as a labor analgesic may have adverse effects on infants' breastfeeding behaviour.

The purpose of this study was to examine the effects of meperidine as a labor analgesic on peripartum breastfeeding and neonatal weight, in term of healthy full-term neonates born vaginally or cesarean.

Materials and methods

After obtaining the approval from the Ethic Committee of Tehran University of Medical Sciences, this pilot cohort study was conducted between October 2010 and October 2011 at the Women Hospital located at the Tehran University of Medical Sciences. The trial population included full-term pregnant women (>37 week of gestation) who planned to deliver at this center (normal vaginally delivery or cesarean). Including criteria for every participated individual was no history of endocrinologic diseases, no history of anatomical disorders of breast, and no history of using any kind of narcotic a month preceding the admission to the hospital or during hospitalization.

Midwives provided all participants with the information about the procedure before obtaining written consent.

Patients were excluded from the study for any of the following reasons: psychiatric medications, anti-convulsants, antidepressants, using tobacco, neurological diseases, endocrine disorders, trauma, postpartum depression, sever preeclampsia, eclampsia, history of breast surgery or chest anomaly, medical or gestational condition associated with IUGR, maternal and neonatal diseases, NICU admission, mastitis, no tendency to breast feeding, addiction, consumption of another narcotic drug, or

having general anesthesia prior or after admission to the hospital. At this stage, any possible terms interfering in the process of lactation, including maternal or neonate hospitalisation or separation was considered, as well. Different forms of questionnaire were used to collect and gather data. Also, before completing the questionnaire, midwives were trained by one of the authors to inform about proper handling the process. This questionnaire had different questions, like obstetric history of mothers and two separate phone numbers to obtain follow-up information within two months after giving birth. One person who was blinded to the study group did all calls.

Based on the obtained data, the participated woman divided into two groups:

i) Full-term pregnant women received meperidine (intramuscular) within 24 hours before delivery or during the postpartum hospital stay for any gynaecological, surgical, or analgesic indication (meperidine group) ii) Full-term pregnant women did not receive meperidine within 24 hours before delivery or during postpartum hospital stay (control group). Although, they received non-opioid medications or spinal anesthesia during cesarean section .In both groups, mothers who had cesarean section only received bupivacaine (bupivacaine 0.5%, 2.7 cc in L4-L5 or L5-S1spaces) to provide surgical state of analgesia.

The variables investigated in two groups were divided into two main categories, including independent and dependent. Independent included: age; height; weight; job; education; previous pregnancy (gravid); number of previous delivery (parity); history of breast surgery or chest anomaly; type of delivery; 1 minute APGAR score; 5 minute APGAR score; hospitalization for high risk or NICU; gestational complications; preeclampsia or eclampsia; diabetes; head surgery or trauma; seizure; addiction; maternal illness or hospitalization; and medication used for increasing breast milk , and dependent included: weight of a two-month neonatal; breastfeeding; formula feeding; and combined nutrition.

Also, to evaluate the success of breastfeeding, nutritional status of infants was placed in three groups: breastfeeding, formula feeding, and combined nutrition (breastfeeding and formula feeding). The weight of infant was asked to be considered as an indicator for sufficient feeding.

There was no attempt to influence physician for choosing meperidine. The breastfeeding education was performed by the corresponding nurse under supervision of the Breastfeeding Committee of the Woman Hospital. It is noted that the hospital is certified as the Baby Friendly Hospital Initiative (BFHI), a worldwide program of the World Health Organisation and UNICEF.

Statistical Method

Analysis was carried out by SPSS statistical software (version 19). The obtained data were compared by Mantel-Haenszel chi-square test. Analysis of confounding variables was performed by chi-square to evaluate any interaction. The relationship between analgesia and weight of two-month newborn was constructed by Ancova test. In a model of regression, independent variables were tested for possible confounder effect.

Results

Between October 1389 and October 1390, of all women planned to delivery in our hospital, 352 women took part in the trial study. Seventy-eight women were excluded from the study because of preeclampsia, mastitis, seizure history, and use of morphine or fentanyl while 90 women were also excluded during the two-month follow up after 5 failed attempts to make phone calls during 10 days. Of the 184 woman were recruited to the trial, 38 women had normal vaginal delivery and 146 had cesarean. Cesarean was more common in control group (83%, p=0.09). Most of the women were housewifes (90.8%) and low educated (90.6%). Average maternal age was about 27 years old; mean maternal weight was 75.2 kg in control group and 76.0 kg in meperidine group; average body mass index was 29.6; most of women had two delivery and one child; mean gestational age was 38.9 weeks; average first minutes Apgar was 8.9 and fifth minutes Apgar was 9.9; and women in control group received about 33.8 (±13.1) mg meperidine before delivery and 37.5 (±13.6) mg after delivery. There was no significant relationship between maternal age (p= 0.71), weight (p= 0.61), body mass index (p=0.87), gravid (p=0.47), parity (p=0.09), gestational age (p=0.64), 1 minute Apgar score (p=0.84), 5 minute Apgar score (p=0.22), neonate sex (p=1.00) and using medication to enhance breast milk (p= 0.37) (Table 1).

Mean weight of two-month neonatal was 5280.5 (±804.2) grams in control group and 5316.0 (±821.1) grams in meperidine group (p=0.81) .Considering herbal medication for enhancing breastfeeding was a

Table 1: Baseline characteristics of meperidine group and control group

variable	group	Mean (±SD) or n (%)	p value
Maternal age	Meperidine	27.70 (±4.89)	0.71
	Control	27.39 (±4.89)	
Maternal weight	Meperidine	76.02 (±15.05)	0.61
	Control	75.22 (±12.81)	
Maternal BMI	Meperidine	29.52 (±5.28)	0.87
	Control	29.69 (±4.62)	
Houswifes	Meperidine	39 (86.7%)	0.21
	Control	118(92.2%)	
Low educated	Meperidine	37 (86.1%)	0.51
	Control	116 (92.6%)	
Neonatal addmission in high risk-ward	Meperidine	5 (10.9%)	0.48
	Control	23 (16.7%)	
Medications used for increasing breast milk	Meperidine	18 (40.0%)	0.37
	Control	45 (32.6%)	
Pervious breastfeeding history	Meperidine	16 (34.8%)	0.12
	Control	68 (49.3%)	
Gravid	Meperidine	2.00 (±0.98)	0.47
	Control	2.13 (±1.04)	
Parity	Meperidine	1.49 (±1.06)	0.09
	Control	1.78 (±1.01)	
Gestational age	Meperidine	38.96 (±1.23)	0.64
	Control	38.86 (±1.23)	
1 minute Apgar score	Meperidine	8.95 (±0.21)	0.84
	Control	8.96 (±0.23)	
5 minute Apgar score	Meperidine	9.82 (±0.50)	0.22
	Control	9.92 (±0.33)	
Neonatal male sex	Meperidine	23 (51.1%)	1.00
	Control	72 (52.2%)	
Cesarean section	Meperidine	32 (69.57%)	0.09
	Control	114 (82.61%)	

SD; Standard Deviation, BMI; Body Mass Index

tool to compare the nutritional habit for two months period. So, there were two categories in this regard. First category had the combined nutrition with formula while the second category had breast feeding with combined nutrition. Table 2 and table 3 demonstrate these comparisons between meperidine and control groups. There was no significant relation between nutritional habit and meperidine in these two categories. p values are 0.07 and 1.00 for category 1 and category 2 , respectively.

Model of regression independent variables were applied for possible confounder effect. Since none of them was recognized to be confounder, there was no necessary to perform regression.

Discussion

This study found no relationship between application of meperidine during labor and peripartum breastfeeding as defined by (three nutritional conditions); in addition, no relationship was detected between application meperidine and the average weight of two-month-old newborn.

In our study, control group used two times more (11%) formula than meperidine group (4%). Although there was no significant statistical difference (p=0.07), it may be a trend in border line of mothers (combined nutrition) used formula. Of course, in large sample size, it is possibly considered to be significant. One hypothesis is that mothers who received meperidine might experience more psychiatric relief during labor; subsequently, they showed a trend to breastfeeding. We assumed that some neurobehavioral changes in newborn or mother interfere with breastfeeding skills or behaviors.

Table 2: Comparison of Breast-feeding in two groups (category 1)

	Breast feeding	Combined nutrition/formula	p value
Control group	98 (71.0%)	40 (29.0%)	1.00
Meperidine group	33 (71.7%)	13 (28.3%)	

Table 3: Comparison of Breast-feeding in two groups (category 2)

	Breast feeding/ Combined nutrition	formula	p value
Control group	133 (96.4%)	5 (3.6%)	0.07
Meperidine group	41 (89.1%)	5 (10.9%)	

Most previous studies investigated the role of epidural anesthesia and/or fentanyl on breastfeeding. Some researchers, like Rosen et al.(11) and Halpern et al. (10) have found no positive relationship between epidural analgesia and breastfeeding. Meanwhile, others, like Beilin et al. (13) have reported a reduction in breast feeding behavior and epidural fentanyl.

The use of systemic medications by Riordan et al.(12) and Nissen et al.(14) has revealed more interfere with lactation. Although Nissen et al. (14) have found adverse effect of intamascular meperidine on breastfeeding because they used a higher dose of meperidine and small trial size (13 women) in compared to our study. Their results could approve the observed trend in our findings. Accordingly, it could be reasonable to get more prominent results in the favor of reduction in peripartum breastfeeding behavior following use of meperidine.

The reason of meperidine effect on breastfeeding behavior is unclear; although, some studies have explained it as side effect of opioid and its metabolites (normeperedine) that made neuromotor changes, then affect sucking reflex, which interferes with neonatal weight gain and formula use.

Scott et al. (15) have believed breast feeding is a multifactorial process. We tried to consider many factors, such as parity, sex and Apgar score to decline bias; although, some situation with obvious effects, like psychiatric disorder and breast anomalies were excluded.

Riordon et al. (12) have used IBFAT as breastfeeding measurement tool; it seems to help subsequent studies to have better breastfeeding assessment.

In short, we followed the findings of Nissen et al. (14) and Beillin et al (13) in the time of follow up. Although most of long-term studies had failed to found interfering effect of opioides in peripartum breastfeeding continuing, individual characteristics ; different administration routes; different pharmacokinetic; and pharmacodynamic characteristics of the administered opioid or its metabolites may affect this results.

We found no statistically meaningful relationship between meperidine and breastfeeding in two-month follow-up. This could be resulted from some major limitations in our study. A large number of our cases were excluded in our follow-up. Most women did not participate in follow- up assay. Failure to get follow-up information for a mean group of patients cloud be considered as a prominent issue which may be a consequence of cultural factors, low education, and socio-economic status . These factors could result in inappropriate data collection. Our research was not multicenter or completely blind type of study. Because this study was pilot, our sample size was not large enough. We did not have enough sources to encourage mothers to participate in a follow-up visit, which would result to collect more information.

Other studies are needed to clarify the relationship between meperidine and breastfeeding. Therefore, for future studies considering the cultural believes and taboos along with other measurements, like computer data recording, use of medical database, large sample size in multi-center, a blinded design of study, and combining the neonatal behavior with biochemical and epidemiologic aspects could help to have more valuable results.

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