

## Breastfeeding and its outcome in Women Receiving Epidural Analgesia for Childbirth

### Abstract

**Background:** Breastfeeding is an important issue in postpartum period and critical to the infant's health, but childbirth interventions such as childbirth analgesia may affect the onset and duration of the process. This study aimed to determine the status of breastfeeding in women receiving epidural analgesia. **Materials and Methods:** This cohort study was conducted on 393 mothers in the postpartum period that had vaginal delivery with or without using epidural analgesia (with their own choice) between December 2017 and September 2018. After selecting the convenient samples, the researcher-made outcome breastfeeding checklists were completed in selected hospitals in Isfahan, Iran, Within 24 hours and 4 weeks after delivery. Data were analyzed using statistical methods (Independent *t* test, Mann-Whitney, ANCOVA, and Chi-square). The significance level of the tests was less than 0.05. **Results:** According to the results, most of the subjects in the two groups began breastfeeding during the first hour after childbirth. There was no significant difference between the two groups in the beginning of breastfeeding while controlling the number of labors. There was no significant difference between the two groups in comparison to the type of milk given to the infant Within 24 hours after birth and 4 weeks after birth, either. There was no significant difference between the two groups in comparison to breastfeeding problems at either time. **Conclusions:** According to the results, saying that there is no negative effect by epidural analgesia on the breastfeeding process, using this analgesia is recommended to promote natural childbirth.

**Keywords:** Breastfeeding, childbirth, epidural analgesia, Iran, onset of lactation

### Introduction

Breastfeeding is an important issue in postpartum period that remains a memory and experience throughout life and can be a critical period in women's lives with regard to their health.<sup>[1]</sup> As recommended by the World Health Organization, breastfeeding reduces the mortality of the infants and has health benefits that will be observed even until adulthood.<sup>[2,3]</sup> The benefits of breastfeeding to the infant include an increase in immune system function, reduction in risk of diabetes, leukemia and asthma, and improvement in nerve growth; the benefits to the mother include a decrease in postpartum hemorrhage and faster involution of the uterus and reduction in uterine, ovarian, and breast cancer.<sup>[4,5]</sup> Hence, the World Health Organization's goals for breastfeeding in 2020 are 60% at 3 months and 25% at 6 months of age, but the current figures are only 33% at 3 months and 14% at

6 months of age,<sup>[6]</sup> whereas there are attempts to raise awareness and education programs on exclusive breastfeeding.<sup>[7]</sup> In the United States, breastfeeding begins in 79% of childbirths, and in 49% of them, it continues until 6 months.<sup>[8]</sup> In Iran, this figure has been reported to be 56.8% at 4 months and 27.7% at 6 months of age.<sup>[9]</sup>

Different interventions such as analgesia during childbirth can potentially alter its pathway and affect the onset and duration of breastfeeding.<sup>[10]</sup> One of the most commonly used methods of labor analgesia is epidural analgesia. Because this method can reduce pain more than other methods,<sup>[11]</sup> it has been increasingly used over the past decades, and it has become the standard method for reducing pain in childbirth in the United States.<sup>[12]</sup> It is also of interest to policymakers in Iran because efforts to promote analgesia, in addition to respecting the rights of mothers, prevent the uncontrolled number of cesareans,<sup>[13]</sup> and the complications of this surgery.<sup>[14]</sup>

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Using this method is of interest to the health authorities because it creates real anesthesia during the childbirth process and can consider the rights of pregnant mothers in accordance with the Charter of Patients' Rights. However, in spite the widespread use of epidural analgesia during childbirth, there has been no agreement between anesthesia and women care providers on the effect of this method on breastfeeding.<sup>[15]</sup>

The effect of epidural analgesia on breastfeeding has been evaluated in several studies with different results. A review study on 23 studies over the years 1994 to 2013 found different results: 10 studies found that epidural analgesia does not affect breastfeeding; 12 studies reported a negative relationship between them, and 1 study reported positive outcomes. Many of the studies examined here were observational, and 3 studies were randomized clinical trials. According to these researchers, the different results of these studies can be lack of control of the external variables that affect successful breastfeeding.<sup>[16,17]</sup> Moreover, in an observational study on vaginal childbirth with epidural analgesia, it was stated that vaginal childbirth with epidural analgesia reduces postpartum depression and increases the probability of breastfeeding after childbirth, indicating that unsuccessful breastfeeding and postpartum depression are associated with childbirth pain.<sup>[18]</sup>

However, the results of the studies are contradictory in this regard, therefore, it is necessary to conduct a comprehensive study on the relationship between these two variables because breastfeeding is essential for the baby's life and the use of epidural analgesia is a proven method for promoting safe and painless childbirth. In this regard, this study was conducted to determine the status of breastfeeding in epidural analgesia recipient women.

## Materials and Methods

This cohort study was conducted on 393 mothers in the postpartum period who had vaginal delivery with or without the use of epidural analgesia (with their own choice) and were hospitalized in obstetric and midwifery wards of 3 selected hospitals in Isfahan, Iran [private hospital (level 2), private hospital (level 3), and charity] from December 2017 to September 2018. In this study, samples were selected by convenience sampling using the sample size formula of  $N = z^2p(1-p)/d^2$ , Z: with 95% confidence coefficient: 1.96, p: An estimation of the relative frequency of each method selection, which is 50% owing to its inaccessibility, and d: is the amount of accuracy that is considered to be 0.05.

It is worth noting that the selection of the hospitals of the study has been done as targeted, and the percentage of sample selection was in the form of quota. Considering the statistics of natural labor in charity hospitals (level 2), private (level 2), and private (level 3) are 60%, 27%, and 13%, respectively. The number of participants selected

from the private hospitals (level 2) was 27%, from the private hospitals (level 3) was 13%, and from the charity hospital (level 3) was 60%.

The researcher after referring to the hospitals of the study and presenting the introduction letter and explaining the goals of the research, referred to the obstetric and midwifery ward and requested the women who had been offered epidural analgesia before or during the childbirth stages (whether accepted or not), who had Iranian nationality and were at the ward of postpartum, and their infants had no abnormalities or any metabolic diseases, for participation in the study. After getting the consent of the research units, a researcher-made checklist, whose face and qualitative content validity was confirmed by the academic members of Midwifery, Gynecology, and Pediatric Wards, divided into two sections of demographic characteristics and breastfeeding status (type, onset, and breastfeeding problems), was provided to the research units to be completed Within 24 hours after labor in postpartum period. Four weeks after the childbirth, the checklist questions were followed up and recorded by the researcher through a phone call and the cases were recorded in it. After collecting the data, they were encoded and entered into SPSS Version 18 (SPSS Inc., Chicago, IL, USA, SPSS) software and were analyzed using descriptive and inferential statistical methods (Independent t test to compare the demographic features, Mann-Whitney to compare breastfeeding starting times, ANCOVA to control the variable of the number of labors in examining the breastfeeding starting time variable, and Fisher's exact test and Chi-square tests to compare breastfeeding problems). The significance level of the tests was less than 0.05.

## Ethical considerations

This research was conducted after receiving informed consent from the research units and receiving the registration number of 396532 from the Office of Vice President for Research at Isfahan University of Medical Sciences on September 25, 2017.

## Results

In total, of 393 subjects who entered the study, 383 subjects (142 women receiving epidural analgesia and 241 women who did not receive epidural analgesia) responded to breastfeeding questions Within 24 hours after childbirth. Then, 4 weeks after childbirth, mothers were also asked about the questions related to the checklist again through a phone call. However, 86 of those who had received epidural analgesia and 149 who did not receive epidural analgesia responded the phone calls. The reason for unresponsiveness of some participants at the time of follow-up was their unwillingness to answer.

Independent t test showed that the mean age of the spouse, the woman's age, and gestational age were not significantly different among women receiving epidural analgesia and those who did not receive epidural analgesia ( $p > 0.05$ ). The

mean number of childbirths in women receiving epidural analgesia was significantly lower than those who did not receive epidural analgesia ( $t_{381} = 3.54, p < 0.001$ ) [Table 1].

Mann-Whitney test showed that the onset of infant's breastfeeding was significantly different in the two groups ( $z = 2.15, p = 0.031$ ), so that women who did not receive epidural analgesia started breastfeeding earlier than those who received epidural analgesia. After controlling the number of pregnancies and deliveries for this variable using ANCOVA test, the results showed that there was no significant difference between the two groups in the onset of breastfeeding ( $p > 0.05$ ) [Table 2].

The Chi-square test with likelihood ratio showed that frequency distribution of the type of milk given to the infant (breast milk, formula, and both) was not significantly different between two groups in both periods ( $p > 0.05$ ) [Table 3].

Fisher's exact test and Chi-square test did not show a significant difference between the two groups regarding breastfeeding problems Within 24 hours after childbirth and at follow-up period ( $p > 0.05$ ) [Table 4].

## Discussion

In this study, which was done to determine the status of breastfeeding in women receiving epidural analgesia for childbirth, the examination of fertility characteristics indicated that there was no significant correlation between fertility features, starting time of breastfeeding in different hours, type of milk, and breastfeeding problems immediately after labor and 4 weeks afterward in the two groups.

Regarding the fertility features, in the studies conducted by Rimaitis *et al.* and Koteles *et al.*, it was found that nulliparous women choose epidural analgesia more than multiparous ones.<sup>[19,20]</sup> The studies carried out by Schytt *et al.* and Gupta *et al.* also suggested that primiparity increases the demand for epidural.<sup>[21,22]</sup> As it is mentioned

in this study and other studies, the nulliparous women are more likely to use this method, which can be owing to the fear of tolerance of the first childbirth pain, unfamiliarity with the maternity ward setting, thus concerning about pain in an unfamiliar and stressful environment.

As already stated, the starting time of breastfeeding at different hours did not have any significant difference between the two groups; however, it seems that the reason for delay in the onset of breastfeeding in epidural analgesia recipients in the current study is the low average of the number of pregnancies and deliveries in this group compared to the non-epidural analgesia recipient group. Therefore, the variable of the number of pregnancy and delivery was controlled by ANCOVA test, and the result showed no significant difference between the two groups in the onset of breastfeeding. The results of the studies conducted by Mauri *et al.*, and Shrestha *et al.* also showed that the onset of breastfeeding was not different in the two groups of epidural anesthesia recipient and non-epidural analgesia recipient<sup>[23,24]</sup> although women who did not receive epidural analgesia tended to start breastfeeding,<sup>[23]</sup> and our study results are consistent with those found in these studies.

In our study, most of the subjects started breastfeeding during the first hour after childbirth in addition to lack of any breastfeeding-related problem in recipients of epidural analgesia, which shows the compliance of midwifery personnel with the Ten Initiative Guidelines for Promoting Breastfeeding in these hospitals that also have Baby-Friendly Hospital Initiative. Henderson *et al.* also concluded in their study that 65% of women who received epidural analgesia and 52% of those who did not receive epidural analgesia started breastfeeding at the first hour after birth,<sup>[25]</sup> and the results of our study are consistent with these studies.

Other results of the present study showed that the type of milk given to the infant was not significantly different between the two groups at either period. In addition, the dominant milk

**Table 1: Demographic characteristics of the subjects**

Variables	Epidural analgesia, n=142, Mean (SD)	No epidural analgesia, n=241, Mean (SD)	Independent t-test		
			t	df	p
Woman's age	27.42 (4.55)	28.18 (4.63)	1.57	381	0.122
Husband's age	34.74 (4.38)	32.28 (4.45)	1.16	381	0.241
Average number of childbirths	1.30 (0.58)	1.52 (0.69)	3.54	381	<0.001
Average gestational age (week)	38.56 (2.06)	38.69 (1.91)	0.64	381	0.521

**Table 2: Comparison of breastfeeding onset in the two groups by controlling the variable of pregnancies number**

Duration after childbirth	Epidural analgesia n (%)	No epidural analgesia n (%)	Mann-Whitney
Immediately after birth	39 (27.50)	80 (33.20)	$z=1.55, df=1, p=0.133$
Within 1 h after birth	58 (40.80)	115 (47.80)	
1-3 h after birth	35 (24.60)	33 (13.70)	
3-24 h after birth	6 (4.20)	8 (3.30)	
24-48 h after birth	0 (0)	2 (0.80)	
48 h after birth until the first week	4 (2.80)	3 (1.20)	

**Table 3: Comparison of the type of milk given to the infant in two groups at different times**

Time	Epidural analgesia n (%)	No epidural analgesia n (%)	Mann-Whitney test
Within 24 hours after birth			
Breast milk	128 (90.20)	228 (94.60)	$\chi^2=2.93$ , df=2, $p=0.232$
Formula	3 (2.10)	4 (1.70)	
Both	11 (7.70)	9 (3.70)	
Follow-up			
Breast milk	70 (81.40)	130 (87.30)	$\chi^2=1.52$ , df=2, $p=0.471$
Formula	2 (2.30)	3 (2.0)	
Both	14 (16.30)	16 (10.70)	

**Table 4: Comparison of breastfeeding problems in two groups at different times**

Time	Breastfeeding problems	Epidural analgesia n (%)	No epidural analgesia n (%)	Chi-square test	RR[CI]
Within 24 hours after childbirth	Wound on the nipple	23 (15.80%)	34 (13.80%)	$\chi^2=0.29$ , df=1, $p=0.59$	-
	Breastfeeding latency	17 (11.60%)	22 (8.9%)	$\chi^2=0.77$ , df=1, $p=0.38$	-
	Lack of suction by the infant	18 (12.30%)	25 (10.10%)	$\chi^2=0.46$ , df=1, $p=0.50$	-
	Lack of adequate milk	22 (15.10%)	24 (9.70%)	$\chi^2=2.54$ , df=1, $p=0.11$	-
	Maternal fatigue	8 (5.50%)	21 (8.50%)	$\chi^2=1.23$ , df=1, $p=0.27$	-
	Birth problems	2 (1.40%)	8 (3.20%)	$p=0.21$	-
Follow-up period	Wound on the nipple	6 (4.10%)	7 (2.80%)	$p=0.34$	1.49[0.52-4.28]
	Breastfeeding latency	0 (0%)	2 (0.80%)	$p=0.39$	-
	Lack of suction by the infant	1 (0.70%)	6 (2.40%)	$p=0.20$	0.29[0.035-2.36]
	Lack of adequate milk	12 (8.20%)	16 (6.50%)	$\chi^2=0.42$ , df=1, $p=0.52$	1.3[0.65-2.62]
	Maternal fatigue	0 (0%)	0 (0%)	$p=1$	-
	Birth problems	0 (0%)	0 (0%)	$p=1$	-

used by the infants is breastfeeding. The findings of Armani *et al.* indicated that there is no difference between the amounts of breastfeeding and using supplementary ingredients for breastfeeding in the two groups (epidural analgesia recipient and non-epidural analgesia recipient),<sup>[26]</sup> and our study is consistent with these studies. However, in a study conducted by Orbach-Zinger *et al.*, breastfeeding in epidural analgesia recipients was lower within 6 weeks after childbirth than those who did not receive epidural analgesia.<sup>[4]</sup> Moreover, the results of a study conducted by Mauri *et al.*, 20 days after childbirth, indicated that the percentage of exclusive breastfeeding in the group who did not receive epidural analgesia and the percentage of supplementary ingredients for breastfeeding and formula in women who received epidural analgesia was more,<sup>[24]</sup> but our study is not consistent with these two studies. The reason for lack of significant difference in the type of breastfeeding in the current study and the studies conducted by Armani *et al.* can be the absence of complications from epidural analgesia, conscious admission of epidural analgesia in participants as a contributing factor in childbirth and postpartum processes. Inconsistency of the present study with that of Mauri and Orbach-Zinger can be owing to the difference of type of mothers' attitudes in these studies depending on the importance of continuity of mother's milk. The culture of Iranian Muslim mothers has well accepted to continue breastfeeding to infants at least until 6 months after labor (exclusive period), whereas this style may not be fashionable in foreigner women.

It was also found in this study that there was no significant difference between the two groups in terms of the frequency of breastfeeding problems Within 24 hours after childbirth and at the time of follow-up. This can be owing to lack of complications from epidural analgesia. The results also indicated that the frequency of breastfeeding problems reported by mothers Within 24 hours after delivery was 224 cases in two groups, which was less than one quarter after the follow-up. Reduction of these problems during follow-up is owing to women's more justification compared to the importance of promoting breastfeeding in accordance with the agents of care guidelines and thus, taking action to solve the problems related to breastfeeding on his behalf. French *et al.* also stated that the awareness of caretakers of the factors affecting breastfeeding will help identify women at risk for breastfeeding difficulties to effectively support and remove the related problems in the long term.<sup>[16]</sup>

This study has internal validity because controlling a confusing variable like the number of labor has been done through ANCOVA test. Moreover, it has external validity because the sample size (393 subjects) has been at an acceptable limit, and it is generalizable to the total population. Of course, in case of promoting this painlessness in other hospitals of the province, it is suggested that such research can be conducted in training, treating and private hospitals for comparison of the results.

In this study, the type of attitude toward breastfeeding, the difference in access to education during pregnancy and after childbirth, as well as the difference in epidural dose are the limitations of research, and the study of the onset of breastfeeding at different times, as well as the examination of various problems related to breastfeeding are the strong points of the study.

## Conclusion

Using epidural analgesia is of interest to the health authorities because it creates real anesthesia during the childbirth process and can consider the rights of pregnant mothers in accordance with the Charter of Patients' Rights. Now, according to the results of this study, saying that no negative effect was found by epidural analgesia on the breastfeeding process because the outcome of breastfeeding was the same in the two groups, it is recommended to use this analgesia to promote natural childbirth in line with national policies for increasing birth.

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## Conflict of interest

Nothing to declare.

## References

- Ahmadi Y, Sharififar S, Pishgooie SAH, Teymori F, Hoseyni MS, Yari M. Comparison of the quality of breastfeeding in postpartum mothers undergone cesarean and vaginal delivery in selected military hospitals of Tehran. *Military Caring Sciences* 2017;4:70-6.
- Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. *Cochrane Database Syst Rev* 2012;Cd003517. doi: 10.1002/14651858.CD003517.pub2.
- World Health Organization. Exclusive breastfeeding for six months best for babies everywhere. Available from: [www.who.int/mediacentre/news/statements/2011/breastfeed-ing\\_20110115/en](http://www.who.int/mediacentre/news/statements/2011/breastfeed-ing_20110115/en). [Last accessed on 2017 Feb 15].
- Orbach-Zinger S, Landau R, Davis A, Oved O, Caspi L, Fireman S, *et al.* the effect of labor epidural analgesia on breastfeeding outcomes: A prospective observational cohort study in a mixed-parity cohort. *Anesth Analg* 2018. doi: 10.1213/ANE.0000000000003442.
- Shamir R. The benefits of breast feeding. *Nestle Nutr Inst Workshop Ser* 2016;86:67-76.
- Holmes AV, Auinger P, Howard CR. Combination feeding of breast milk and formula: Evidence for shorter breast-feeding duration from the National Health and Nutrition Examination Survey. *J Pediatr* 2011;159:186-91.
- Ben Natan M, Wiener A, BenHaim Y. Womens intention to exclusively breast feed: The Israeli perspective. *Midwifery* 2016;34:173-7.
- Fong A, Chau CT, Pan D, Ogunyemi DA. Amniotic fluid embolism: Antepartum, intrapartum and demographic factors. *JMaternFetal Neonatal Med* 2015;28:793-8.
- Olang B FK, Heidarzadeh A, Strandvik B, Yngve A. Breastfeeding in Iran: Prevalence, duration and current recommendations. *Int Breastfeed* 2009;4:8.
- American College of Obstetricians and Gynecologists. ACOG Committee Opinion No. 361: Breastfeeding: Maternal and infant aspects. *Obstet Gynecol* 2007;109:479-80.
- Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. *Cochrane Database Syst Rev* 2011;Cd000331. doi: 10.1002/14651858.CD000331.pub3.
- Cambic CR, Wong CA. Labour analgesia and obstetric outcomes. *BrJAnaesth* 2010;105(Suppl 1):i50-60.
- Emani F, Faridari N, Taheri A, Abolahrar N, Entezari SR, Rahimzade P, *et al.* Childbirth protocol, treatment adjutancy of ministry of health and medicine education, Tehran: Gooya publication; 2015:1.
- Montgomery A, Hale TW. ABM clinical protocol #15: Analgesia and anesthesia for the breastfeeding mother, revised 2012. *Breastfeed Med* 2012;7:547-53.
- Tavakolipoor Sh, Nekuei N S, Beigi M. Evaluating the prevalence of different types of obstetric hemorrhage and its related factors in the second- and third- level hospitals affiliated to isfahan university of medical sciences, iran, during the third quarter of year 2018. *Isfahan Medical School* 2018;36:673-9.
- French CA, Cong X, Chung KS. Labor epidural analgesia and breastfeeding: A systematic review. *J Hum Lact* 2016;32:507-20.
- Szabo AL. Review article: Intrapartum neuraxial analgesia and breastfeeding outcomes: Limitations of current knowledge. *Anesth Analg* 2013;116:399-405.
- Ding T, Wang DX, Qu Y, Chen Q, Zhu SN. Epidural labor analgesia associated with a decreased risk of postpartum depression: A prospective cohort study. *Anesth Analg* 2014;119:383-92.
- Koteles J, de Vrijer B, Penava D, Xie B. Maternal characteristics and satisfaction associated with intrapartum epidural analgesia use in Canadian women. *Int J Obstet Anesth* 2012;21:317-23.
- Rimaitis K, Klimenko O, Rimaitis M, Morkunaite A, Macas A. Labor epidural analgesia and the incidence of instrumental assisted delivery. *Medicina (Kaunas)* 2015;51:76-80.
- Gupta N, Gupta S, Agrawal A, Agrawal S, Diwedi S, Singh J. To study the acceptance of epidural analgesia for painless labor at a tertiary care centre. *Int J Reprod Contracept Obstet Gynecol* 2017;3:1087-9.
- Schytt E, Waldenstrom U. Epidural analgesia for labor pain: Whose choice? *Acta Obstet Gynecol Scand* 2010;89:238-42.
- Shrestha B, Devgan A, Sharma M. Effects of maternal epidural analgesia on the neonate--a prospective cohort study. *Ital J Pediatr* 2014;40:99.
- Mauri PA, Contini NNG, Giliberti S, Barretta F, Consonni D, Negri M, *et al.* Intrapartum epidural analgesia and onset of lactation: A prospective study in an Italian birth centre. *Matern Child Health J* 2015;19:511-8.
- Henderson JJ, Dickinson JE, Evans SF, McDonald SJ, Paech MJ. Impact of intrapartum epidural analgesia on breast-feeding duration. *Aus N Z J Obstet Gynaecol* 2003;43:372-7.
- Armani M, Gaggiano C, Dallaglio S, Romanini E, Sospiri C, Magnani C. Are there any strategies to improve neonatal outcomes associated with epidural analgesia in labor? *Acta Biomed* 2013;84:117-23.