


A Comparison of the Characteristics of Neonates Born by Normal Vaginal Deliveries and Cesarean Sections

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ABSTRACT

Background & Objective: Cesarean sections without indication, compared to normal vaginal deliveries, bring about many consequences for the mother and her fetus. Therefore, this study aimed at comparing the characteristics of neonates born by normal vaginal deliveries and caesarean sections.

Materials & Methods: In this cross-sectional study conducted from 2015 to 2019, 736 term neonates aged 3 to 12 days old with a weight > 2.5 kg and a gestational age > 37 weeks referred to a neonatal clinic were studied after obtaining their parents' full consent. A researcher-made questionnaire examining maternal personal information, neonate's characteristics, breastfeeding status, and the type of delivery was completed. The obtained data were analyzed via SPSS 22, using a t-test and Chi-square test.

Results: In the present study, out of the 736 term neonates, 409 neonates (55.6%) were born by normal vaginal deliveries and 327 neonates (44.4%) were born by caesarean sections. There were statistically significant differences between the two methods of delivery in terms of the frequency of breastfeeding per day ($P=0.002$), the frequency of urination per day ($P=0.007$), the first postpartum defecation time ($P=0.027$), and neonates' chief complaint ($P=0.004$).

Conclusion: The results of the current study showed that the neonates born by normal vaginal deliveries, compared to those delivered by caesarean sections, had a more favorable status, regarding the frequency of breastfeeding, the frequency of urination per day, and the first postpartum defecation time. Moreover, the level of weight loss (g) per day and the percentage of daily weight loss were higher in the neonates born by caesarean sections compared to the other neonates.

Keywords: Breastfeeding, Cesarean section (CS), Neonatal characteristics, Normal vaginal delivery (NVD)



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Introduction

Maternal and neonatal mortality and health, which are indicators of health status in every society, can be mentioned among the most important issues in reproductive health. In this regard, the rate of cesarean section (CS) (the number of CS cases divided by total birth) is one of the most significant indices in every country. The cornerstone of the CS is to save the lives of the mother and her neonate; however, unfortunately, it has increased maternal and neonatal morbidity and mortality without medical indication increase (1). In response to the increase in CS, the World Health Organization (WHO) estimated the expected rate of CS at 5% to 15% (2).

CS without indication brings about many consequences for the mother and her fetus compared to normal vaginal delivery (NVD). Among the

complications that can happen to a mother due to CS (which are 5 to 10 times more than NVD), hemorrhage, complications of anesthesia, embolism, wound infection, pelvic infection, pulmonary infection, urinary tract infection, venous thrombosis and psychiatric complications, such as anger, anxiety, feeling guilty, and hopelessness in the mother, and high maternal mortality after CS (7 times more than NVD) can be noted, all of which raise the cost of childbirth by 2 to 3 times for the mother and her family (3). The medications used in CS affect the neural-behavioral state of the neonate and the early onset of breastfeeding. These medications can delay or suppress lactogenesis and enhance the risk of more weight loss of infants. An intravenous injection of opioids during childbirth may influence the neonate's normal reflexes for breast search in the first hours of birth (4).

Concerns about the complications of NVD, especially fetal complications, are among key factors in choosing CS by mothers and their gynecologists. On the other hand, an NVD should be performed in a safe, principled, and scientific condition to minimize maternal and neonatal complications. In a study, CS was associated with more neonatal complications compared to NVD. Respiratory problems included neonatal transient tachypnea, respiratory distress syndrome, and neonatal hospitalization at intensive care units (5). Furthermore, cultural beliefs play important roles in people's attitudes towards the type of delivery, the definition of delivery, and delivery-related beliefs and behaviors. Therefore, it is possible to increase the rate of NVD by providing appropriate training programs and by raising awareness and correcting misconceptions about NVD (6).

Breastfeeding problems have been less frequently reported in NVD (7) and the proper breastfeeding status and breastfeeding frequency were more in NVD in comparison with CS (8, 9). Although a CS brings about many consequences and complications for the mother and her fetus and is not applicable except in specific medical cases, the tendency for having a CS has increased worldwide. Given the high rate of CS, their greater risks compared to NVD, and the variations in the results of different studies conducted to examine their difference, this study aimed at comparing neonatal characteristics in neonates born by NVD and CS.

Materials and Methods

In this cross-sectional study conducted from 2015 to 2019, 736 term neonates aged 3 to 12 days old weighing >2.5 kg referred to a neonatal clinic were studied. A convenience sampling method was applied. Exclusion criteria included congenital anomaly, asphyxia at birth, and preterm neonates. The current study was approved by the Ethics Committee of the Mashhad University of Medical Sciences (IR.MUMS.MEDICAL.REC.1398.280) and written consent was obtained from the neonates' parents before entering the study.

Study information was gathered using a researcher-made questionnaire including three parts. The first part examines maternal information (maternal age, the type of delivery, maternal weight, the number of deliveries, maternal education, and parental perception of their neonate's status). The second part assesses neonatal information (age, gender, birth weight, current weight, Apgar score, jaundice, the frequency of defecation and the frequency of urination per day, volume of urine, the first postpartum defecation time, the first postpartum breastfeeding, the frequency of breastfeeding per day, the duration of breastfeeding, and their main complaint).

Afterward, the neonates were divided into two groups: NVD (the control group) and CS (the case group). The mentioned information was collected by

interviewing the mothers. The validity of the questionnaire was determined using valid sources and taking advantage of experts' opinions. The test-retest method was used to determine reliability. Its Cronbach's alpha coefficient was 0.8. The obtained data were analyzed via SPSS 22 (SPSS Inc., Chicago, IL, USA), using a student's t-test and chi-square test. P -value < 0.05 was considered statistically significant.

Results

In the present study, out of 736 term neonates, 409 neonates (55.6%) were born by NVDs and the other 327 neonates (44.4%) were born by CSs. The average age of the neonates in the NVD group was 6.85 ± 3.91 days and it was 7.37 ± 4.07 days in the CS group ($P=0.084$). The mean birth weight of the neonates in the NVD group was 3206.92 ± 465.25 and it was 3227.00 ± 454.40 g in the CS group.

There were no significant differences between the two delivery methods, in terms of birth weight ($P=0.557$), current neonatal weight ($P=0.588$), Apgar score ($P=0.534$), the duration of breastfeeding ($P=0.141$), the frequency of defecation per day ($P=0.992$), the number of maternal deliveries ($P=0.387$), and maternal education ($P=0.742$) (Table 1).

However, there were significant differences in terms of the frequency of breastfeeding per day ($P=0.002$), the frequency of urination per day ($P=0.007$), the first postpartum defecation time ($P=0.027$), maternal age ($P=0.000$), and maternal weight ($P=0.002$) (Table 1). This means that the frequency of breastfeeding per day, urination per day, and the first post-partum defecation time were higher in the neonates born by NVDs compared to the other group. However, the level of weight loss (g) per day, the percentage of daily weight loss, and maternal age and weight were higher in the CS group than the NVD group.

Examining the type of delivery and neonate's gender showed no significant relationship between these two variables ($P=0.853$). In the present study, the chief complaint had a statistically significant relationship with the type of delivery. This means that the most common complaint at the time of referral mentioned by the parents of the neonates born by NVDs and CSs was routine care and poor nutrition, respectively ($P=0.004$). The fontanel status was significantly correlated with the type of delivery ($P=0.012$). This means that the rate of inverted fontanels was higher in the neonates in the CS group compared to the other group. Moreover, hyperthermia ($P=0.268$) and jaundice ($P=0.766$) were not significantly related to the type of delivery. There was a significant relationship between parental perception of their neonates and the type of delivery ($P=0.001$). This means that parents of the neonates in the CS group had higher

perceptions of their neonates' condition compared to the parents of the other neonates.

Table 1. A comparison of the means of neonatal, maternal, and laboratory characteristics of the neonates born by NVDs and CSs

Variables	Neonates born by NVDs N=409 (55.6%)	Neonates born by CSs N=327 (44.4%)	P-value T-Test
Birth weight (g)	3206.92±465.25	3227.00±454.40	0.557
Weight loss (g) per day	21.49±62.50	32.13±71.39	0.032
Percentage of daily weight loss	0.62±1.936	0.96±2.206	0.029
Apgar score	8.97±0.44	9.01±0.37	0.534
First breastfeeding time (h)	1.95±1.88	2.44±2.38	0.010
Frequency of breastfeeding per day	9.63±2.27	8.07±2.71	0.002
Breastfeeding duration (min)	19.32±8.73	18.36±8.73	0.141
Frequency of urination per day	5.32±1.78	5.01±1.64	0.007
Frequency of defecation per day	3.86±2.27	3.86±2.06	0.992
First postpartum defecation time (h)	12.63±11.53	10.28±10.24	0.027
Maternal age (y)	25.31±5.06	28.31±5.55	0.000
Number of maternal deliveries	1.59±1.05	1.68±1.12	0.387
Maternal education (y)	10.51±4.80	10.35±4.75	0.742
Maternal weight (kg)	68.42±10.92	72.83±14.79	0.002

Discussion

The results of the current study showed that the neonates born by normal vaginal deliveries, compared to those delivered by caesarean sections, had a more favorable status, regarding the frequency of breastfeeding, the frequency of urination per day, and the first postpartum defecation time. Moreover, the level of weight loss (g) per day and the percentage of daily weight loss were higher in the neonates born by caesarean sections compared to the other neonates.

Base our finding, breastfeeding began earlier in NVDs than CSs. According to the results of a previously carried out study, maternal hospitalization, maternal return to routine activities, and the initiation of breastfeeding were earlier in NVDs in comparison to CSs (5). Due to the importance of the type of delivery in continuing breastfeeding, having the same room for the mother and her neonate and early breastfeeding, which plays an important role in the neonate's survival, are recommended to support breastfeeding. In CSs, breastfeeding is delayed due to the use of anesthetics, the passage of the medication through the placenta to the fetus, and the effects of the drug lasting for hours in the body (10). The medications used in CSs affect the neural-behavioral state of the infant and the early onset of breastfeeding. They can delay or suppress

lactogenesis and increase the risk of weight loss of infants. An intravenous injection of opioids during childbirth may affect the neonate's normal reflexes for breast search in the first hours of birth (4). Breastfeeding in the first hours of birth has been emphasized by the WHO as the 4th step of the decuple steps of breastfeeding success in a child-friendly hospital (11). Therefore, early feeding is delayed in CSs and this may be problematic for the neonate and her mother as it may delay the letdown reflex of milk and lead to more weight loss and more breast problems (7,8).

In the current study, the frequency of breastfeeding was higher in the neonates born by NVDs. Neonatal dehydration is most commonly seen in neonates who breastfed less than eight times a day. Frequent breastfeeding on the first few days usually results in easier milk flow, less weight loss, and less jaundice in the neonate (12). Breastfeeding should be based on the neonate's request. Neonates should be breastfed at least 8 to 10 times per 24 hours until breastfeeding maintenance (until fourteen days of life). Successful breastfeeding is characterized by increased urination and defecation frequencies and adequate weight gain (13). A study showed that controlling neonate's weight, the frequency of breastfeeding, breastfeeding status, breast

changes during breastfeeding, and urination and defecation may be effective in early detection of reduced milk intake and controlling its complications (14). Breastfeeding is expected to be relatively adequate by the fourth day of birth; however, inadequate breastfeeding at the first day of birth may delay milk flow and reduce neonate's weight (15). Repeated breastfeeding, depending on the neonate's needs, should not be less than eight times a day, contributing to the production and release of milk and continuing it (16). Unlimited nutrition, depending on the neonate's demand, works well for both mother and her neonate. For neonates, the most significant effect is to receive more milk, gain weight, and lower bilirubin levels during the first few days of birth, and for mothers, it prevents congestion and nipple fissures (17). It seems that due to great maternal consciousness and preparation at NVDs, breastfeeding begins earlier and continues with confidence, leading to improved maternal and neonatal health.

In this study, the neonates who were born by CSs had a 1.5 times greater daily weight loss than those born by NVDs. Inappropriate breastfeeding status caused by CSs or breast pain not only can reduce breastfeeding, but also can exacerbate breastfeeding problems that lead to weight loss and renal failure. Therefore, paying attention to breastfeeding status and causes that may disrupt proper breastfeeding is important and correcting them may prevent the neonate from less breastfeeding in the first few days of his/her life and, thereby, reduce the risk of renal failure (18). Significant maternal and neonatal consciousness at birth, maternal preparation for breastfeeding during labor, fast and more appropriate mother-to-child communication, early initiation of breastfeeding, and more frequent breastfeeding in NVD compared to CS lead to more appropriate weight gain and reduce weight loss.

In the present study, the frequency of urination per day was higher in the neonates in the NVD group than the other group. Reducing the frequency of breastfeeding per day, shorter breastfeeding duration, greater severity of weight loss, less frequent urination and defecation are risk factors for maternal and neonatal renal failure (18). The results of a study demonstrated that neonates born by CS did not have immediate skin-to-skin contact with their mother after birth, so they received less milk at the first hour of birth compared to those born by NVD. In general, the neonates born by CSs received less milk in the delivery room (19); therefore, the frequency of urination also decreased. If this decrease in breastfeeding continues, the neonatal kidney tries to reabsorb sodium in the urine and keep the liquid, as a defense mechanism, and the subtle discharge of fluids from the lungs and body due to

insufficient maturation of the neonate's skin may exacerbate dehydration. If this decrease continues, it leads to renal failure and hypernatremia in the neonate (20). The decrease in urination frequency in the CS-born neonates indicated that in addition to losing weight in the first weeks, special attention should also be paid to the neonates' urinary output, which may be an indication of the adequacy of breast milk. Decreased urination frequency is an early sign of inadequate breastfeeding (18). Since urination and defecation are signs of sufficient breastfeeding, it is important to control the frequency of urination in neonates to prevent hypernatremic dehydration (21).

In the current study, the maternal age of those who underwent CSs was higher than the mothers who had NVDs. This finding is similar to the results of a study carried out by Boskabadi *et al.* (2014) (8). In recent decades, maternal age at delivery has increased just like the rate of CSs. It is unclear whether the increase in the rate of CSs is due to medical complications caused by maternal age or due to maternal age itself (22). In the study of Koray *et al.*, the rate of NVDs was higher in mothers under 18 years of age and the rate of CS was higher in mothers who were older than 35 years old (23). In the study of Rydahl *et al.*, and another study by Osmundson *et al.*, the rate of cesarean section increased with increasing maternal age (24,25).

Conclusion

The results of the current study showed that the neonates born by normal vaginal deliveries, compared to those delivered by caesarean sections, had a more favorable status, regarding the frequency of breastfeeding, the frequency of urination per day, and the first postpartum defecation time. Moreover, the level of weight loss (g) per day and the percentage of daily weight loss were higher in neonates born by caesarean sections compared to other neonates.

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Conflict of Interest

Authors declared no conflict of interests.

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